COLOR SECTION

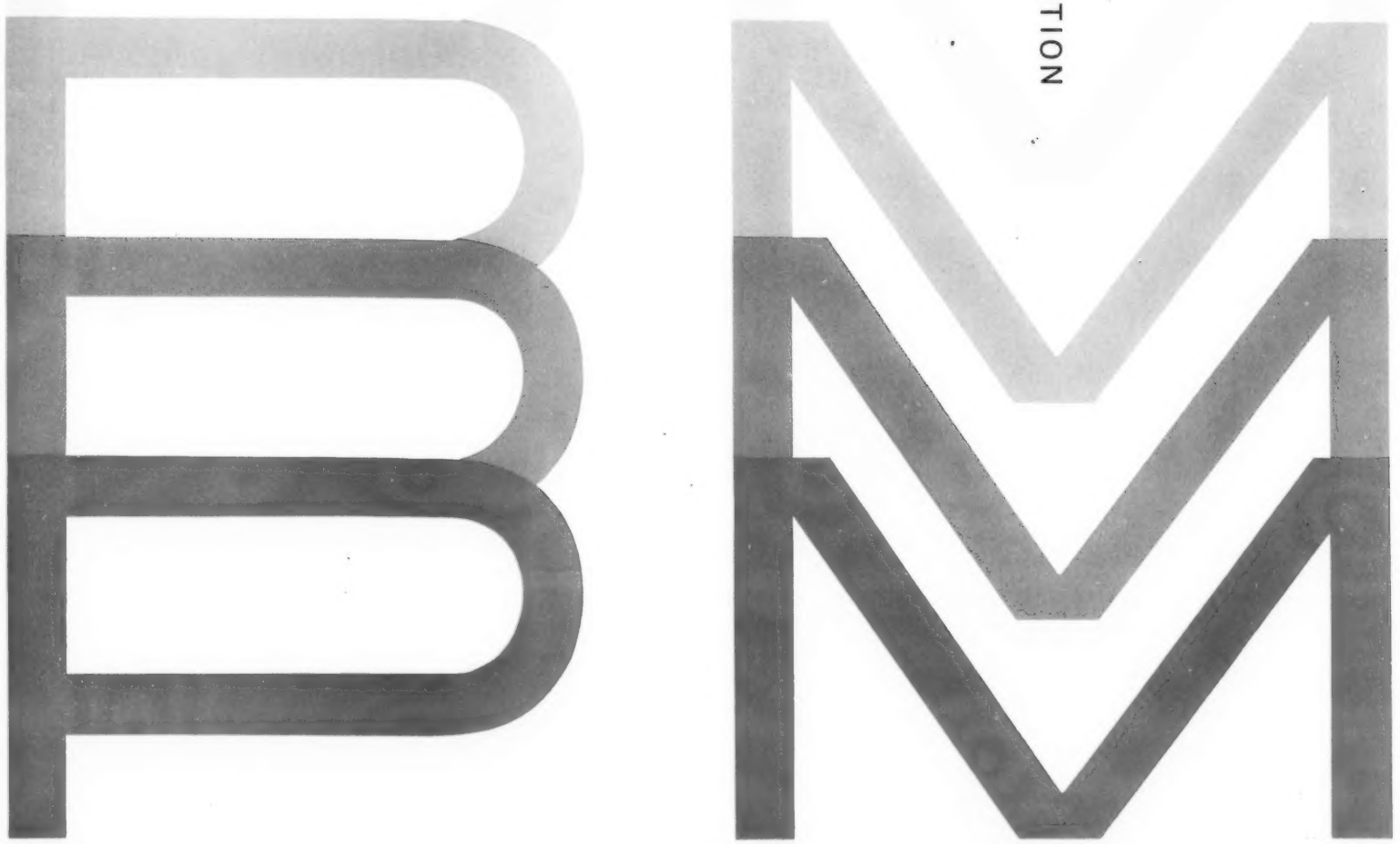

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PHOTO METHODS FOR INDUSTRY

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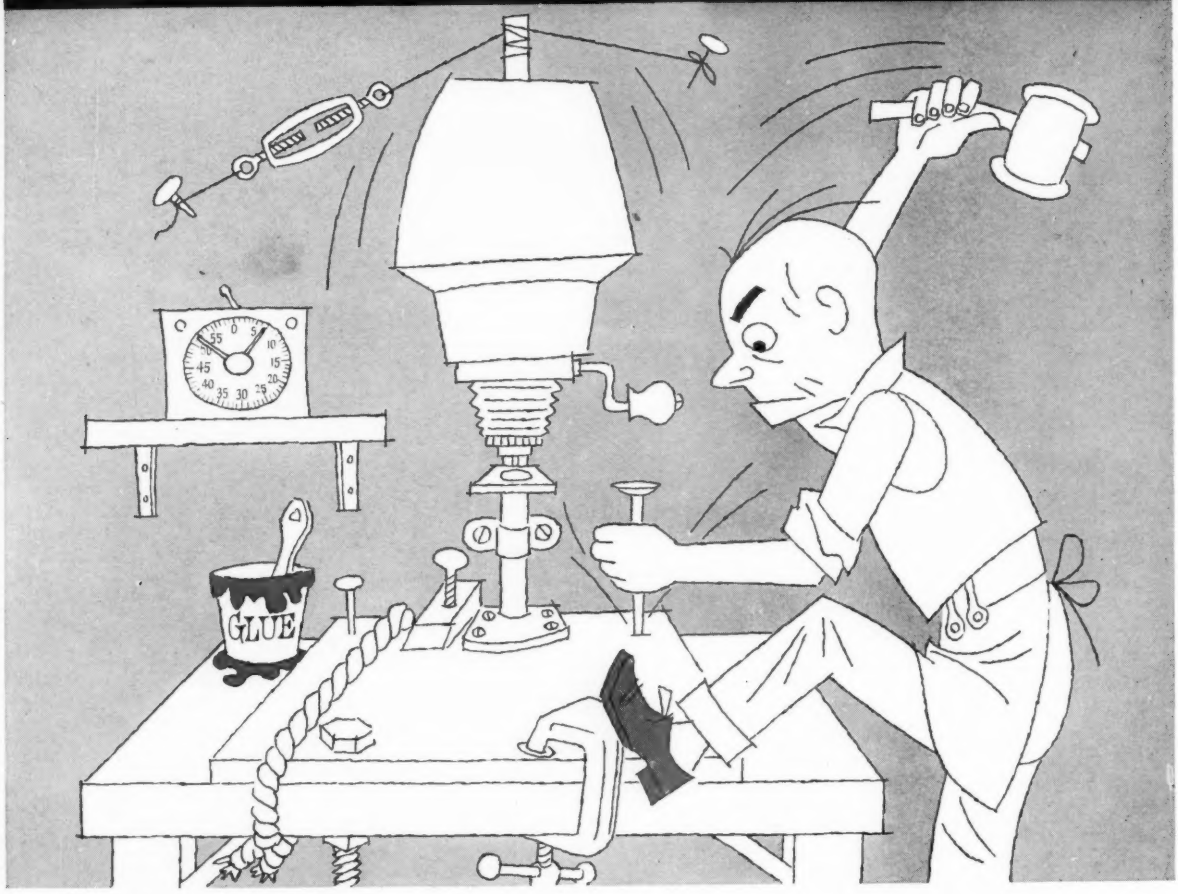

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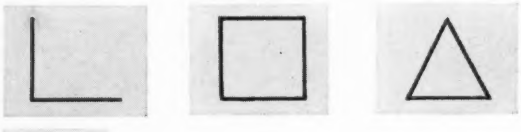

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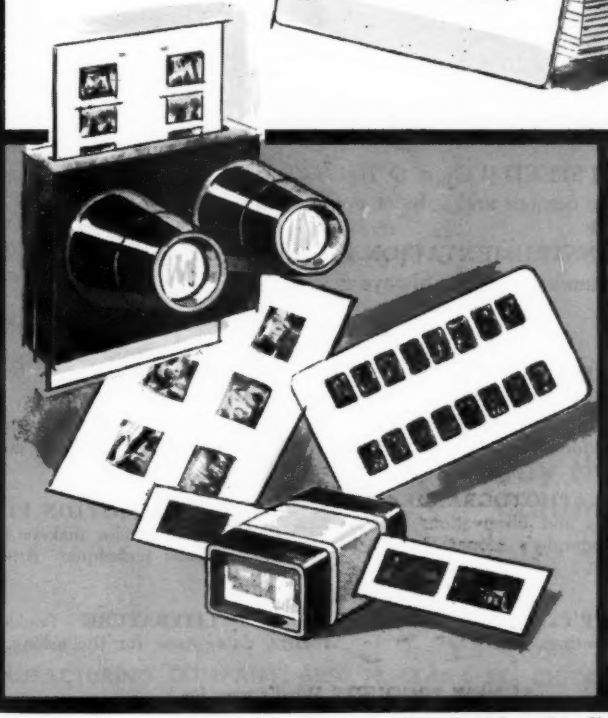

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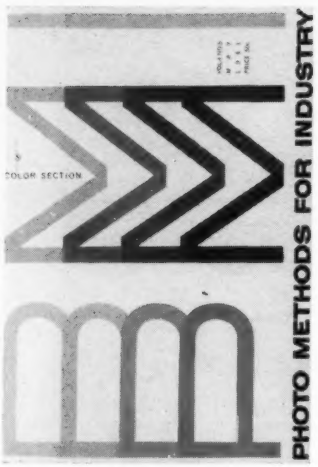

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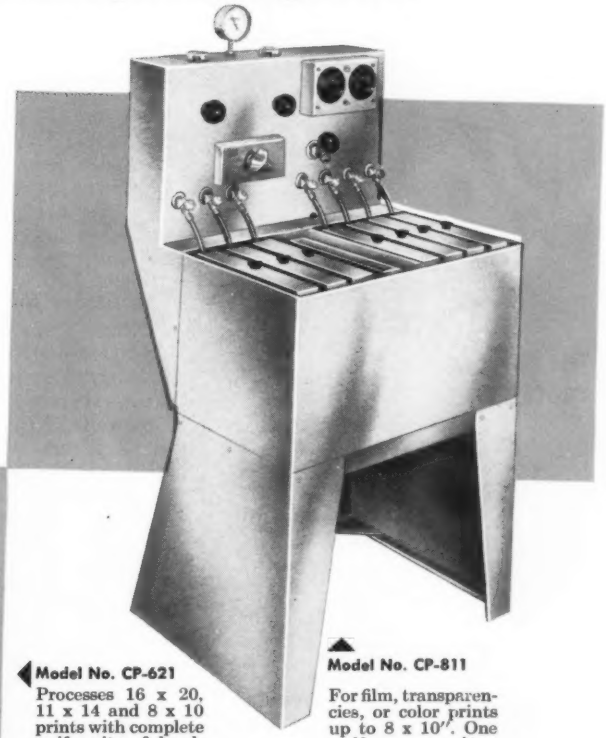

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F.Y.I.

As all careful readers of this space know, we are always campaigning (without too much success at times) for early news releases. Our mail is full of items with time interest that we would print without any hesitation, except that they reach us two days after the announced meeting has been held. Lest anyone accuse us of not practicing what we preach, we hereby print this announcement:

The Second Annual ASMP Photo-Journalism conference in the West at Asilomar, Calif., will be held September 26-29, 1961. Details are available from the University of California, University Extensions, Berkeley 4, Calif.

You see, nothing to it. Just send the invitation on time.

The tender grapevine

News from the West: **Robert Scott**, formerly manager of Film Communications at Douglas Aircraft, is now Associate Director, Government Relations, Audio-Visual Requirements, Aerospace Corp., El Segundo, Calif.

Bill Gibson is now Manager, Film Communications, at Douglas, in charge of all still and cine photography for all divisions.

At the risk of being parochial, we would maintain that photographers are more peripatetic than book reviewers. As proof, here is a list of photo types who went to Kwajalein Island to record Nike Zeus test activities: **Ted Williams** for Western Electric; **Jack Leuddeke** for Bell Telephone Labs; **Andy Gold** for Transfilm Caravelle; **Jack Gabrielson, Walt Tufts** and **Dick Backus**, all of Douglas.

Incidentally, you too can latch on to our Western grapevine by writing Ernest Reshovsky c/o PMI or calling him in Los Angeles at WE 3-9128 or NO 1-0363. For easterners, just contact PMI at 33 W. 60th St., New York 23, N. Y.

If any of our readers happens to hit New York between now and May 21, drop in at the Museum of Modern Art to catch the "Steichen, the Photographer" exhibit. Any comment from this department on the man or his work would be presumptuous if not superfluous. Just see it if you can.

The color prints, incidentally (that word is getting a lot of use this month), were made by Norman Kurshan of Norman Kurshan Color Service.

A final reminder before we call it a month. Kent State Short Course in Photojournalism, June 13-16. For details, write Harold Van Winkle, Director, Kent State University, Kent, Ohio.

Every once in a great while, during the preparation of a story, editors forget who they are and begin to act slightly human. In this semi-human state, they do all sorts of things like making errors and not spotting them until the magazine reaches the reader.

The latest misadventure occurred in the March 1961 issue in the story on TWA. A photograph on page 49 shows one Henri La Londe using a Beseler enlarger to make quick copies on Kodalith. Somehow, in the mysterious ways in which these things always happen, the caption identified this enlarger as a different make, to the embarrassment of all concerned. For the record and to make amends, however tardy, here is the photograph with the correct caption, identifying the enlarger as a Beseler.

Henri La Londe, photographic specialist makes quick copies on Beseler.

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David B. Eisendrath, Jr.

WORKING PHOTOGRAPHER

Some comments on the scope of photography's industrial role

Quite often these days I am asked to discuss the subject of "industrial photography," and just what this term means, anyway. One of the real problems in our field is that although we are trying hard to sell ourselves as being a part of the communications field, we are often incapable of verbalizing a satisfactory concept of what our specialized field encompasses.

There is (or should be) no secret about this writer's feelings about what the field includes, what it does and what an industrial photographer does. Certainly no one has been more outspoken in trying to make people, both in the field and outside it, fully aware of our potential. I have been carrying on a crusade for many years aimed at enlightenment, for I feel that one sure way for photographers in industry to get the respect and recognition they all seem (justifiably) to seek, is by letting industry know not only what photography *is doing*, but what it *can do*.

Stumbling block

First big bugaboo we must overcome, I think, is the acceptance and admission with pride and dignity that industrial photography is not only photography *of* industry, but also photography *for* and *about* industry. And by industry, please note well that I and other supporters of this gospel mean not only manufacturing, but photography for engineering, science, education, and government as well as for industry. One of the keynotes of all industrial or functional photography is that it is primarily *purposeful* photography.

I feel that the term "industrial photographer" is a collective term, for it encompasses many aspects, and like the terms "crowd," "group," or "society," really covers many variables with some common characteristics. The field of industrial photography is in many ways like the field of medicine, for it embraces a host of specialists and many general practitioners. And there are some—like Dick Kinstler, Pete Jowise, Lloyd Varden and others—who are well-versed in almost every phase of the field, and some specialist's specialists who can't load a Beckman & Whitley Magnifax, can't make good pictures of their own kids, and not only don't know how to shoot aerials, but get airsick besides. The field itself includes specialists and tyros, top technicians and bored hypo-benders, and as mixed a group as you can imagine.

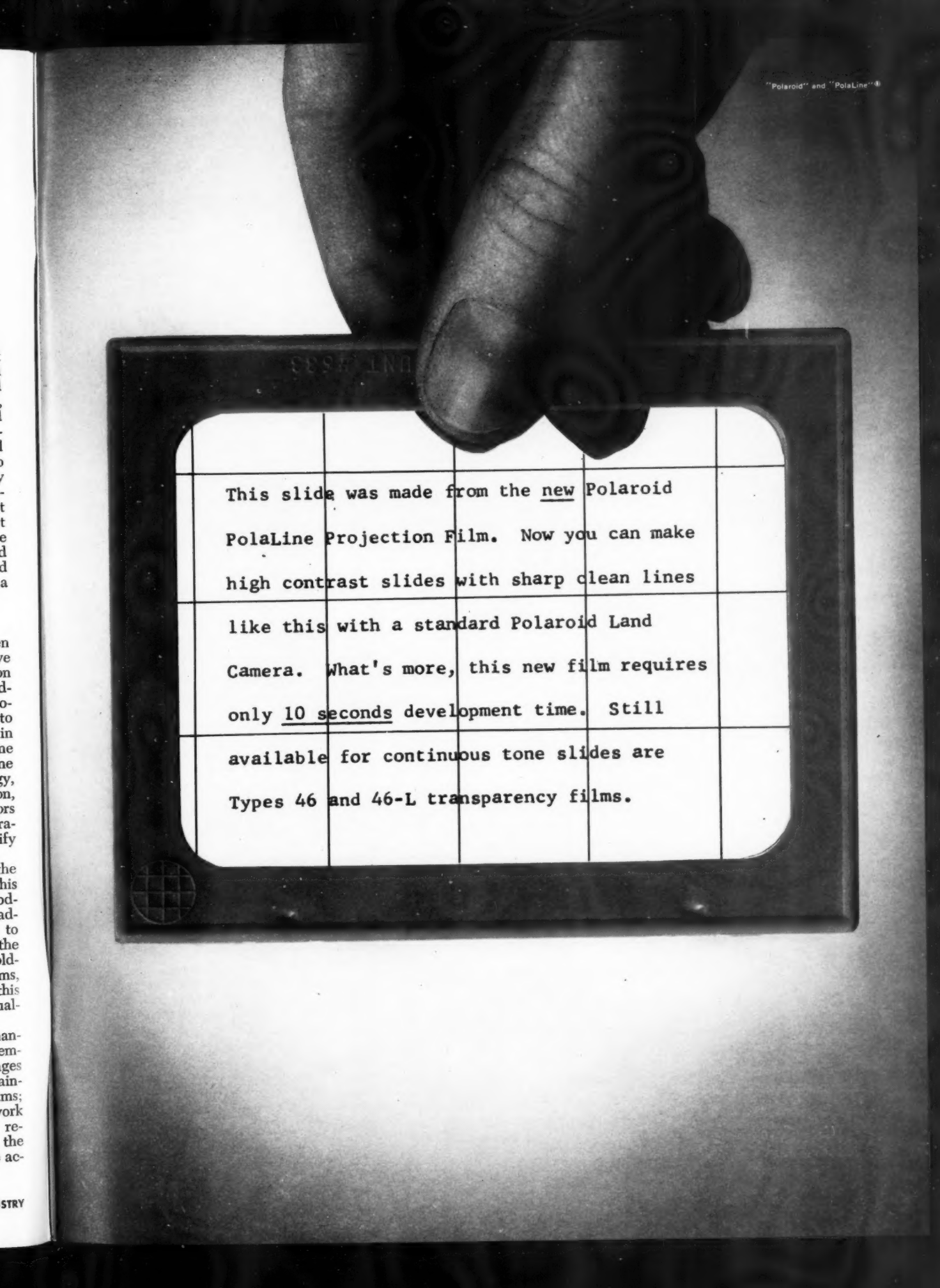
V for victory

Those of us who have been active in studying the field have long felt that some organization and terminology were sorely needed. I have been fighting for photo-semantics for years, and hope to come up with some results soon in this field. At any rate, just as one sees the profession of medicine with its specialties like neurology, pediatrics, dermatology, and so on, the observers and commentators on the field of industrial photography (such as this writer) classify our field into five major areas:

External relations Certainly the best known phase of our field, this includes pictures of finished products, with corporate relations, advertising, and anything having to tell the outside world about the company, its products, stockholders, employees, the corporate aims, intents and purposes. Usually this requires photographs of high quality and finish.

Internal relations This serves management's interest in employer-employee relationships and ranges from identification badges to training and sales instruction programs; orientation and indoctrination, work instruction, tool identification, reports on products in use, and the good-will coverage of employee ac-

(*continued on page* 10)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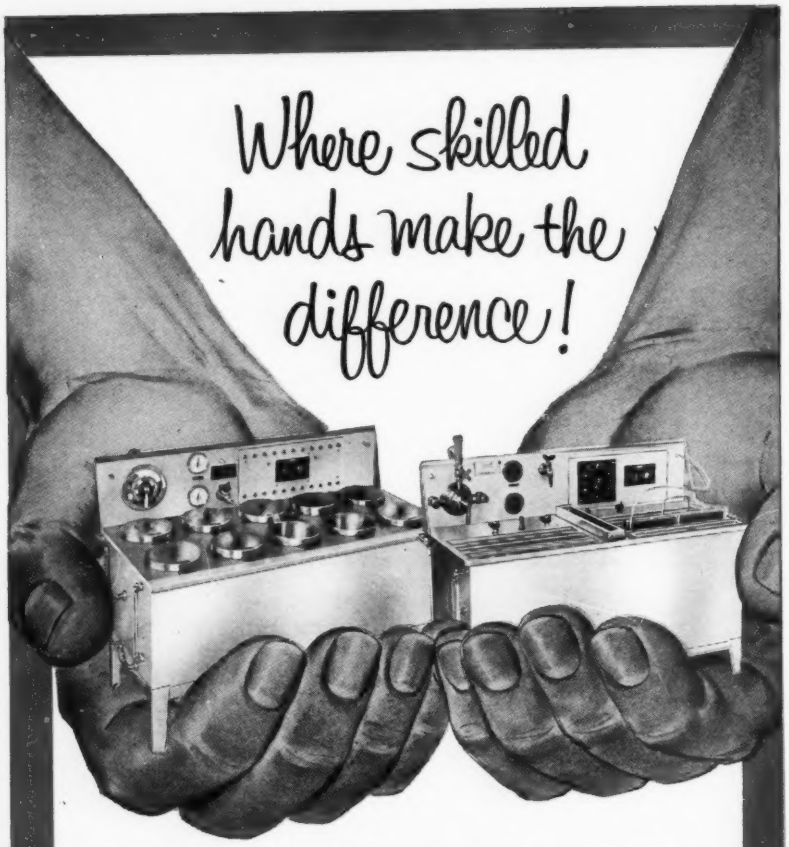

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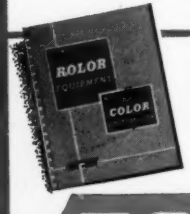

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WORKING PHOTOGRAPHER

(*continued from page* 8)

tivity in plant publications.

Record photography is sometimes a specialized aspect of industrial communications but properly and often handled in the photography department. It includes such classic projects as reproduction of engineering drawings, diazotypy, Photostat, microfilming, as well as simple office reproduction of letters, orders and daily mail. Many organizations are involved in more complex reproduction systems, operating full color-printing presses and producing their own catalogs, reports and instruction books.

Production photography has to do with actual manufacturing operation where photography is the tool used to expedite the end product. This includes making of nameplates and insignia, photo-etching and photo-milling, printed wiring and printed circuitry, and the manufacture of tools, jigs, dies, templates, patterns and parts. Inventory and quality control are often aided by photography, too.

Research and development This aspect utilizes perhaps the greatest variety of technical skill and know-how, for it is in the fields of science and engineering that photography is so valuable to measure, explore, see and remember. Photography is the medium by which time is expanded or compressed, space is modified or extended, and it is the tool which enables man to penetrate, differentiate, examine, and remember.

Although much of the end product of our field may not be beautiful on artistic grounds, we must never overlook the fact that it is purposeful and has a high value as a communications tool.

I believe that when industrial photographers understand that the advertising photographer and the product photographer, and the graphic arts photographer and the high-speed cameraman, the photomicroscopist and the microfilmer and all the rest of the practitioners in our field are *serving* industry in various ways, they will then be willing to sell the service of industrial photography and will help all of us.

I believe that the day will come when our communications will be improved and industrial photographers will be accepted as the *professionals* they are, with pride in their work (this means work to be proud of) and will bear the professional title with the dignity to which they are entitled.—THE END

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JUNE 2 & 3 Industry Film Producers Association Second National Convention. Miramar Hotel, Santa Monica, Calif.

JUNE 11-14 Annual Industrial Advertising Exposition, Statler Hilton Hotel, Boston, Mass.

JULY 6-10 Professional Photographers of Calif., Inc., Western States Convention, Long Beach, Calif.

JULY 16-20 National Institute for A-V Selling. Indiana University, Bloomington, Ind.

JULY 22-25 National Audio-Visual Convention. Morrison Hotel, Chicago.

AUGUST 21-24 Biological Photographic Association Annual Meeting. Pick-Congress Hotel, Chicago.

MONTHLY MEETINGS

Association of Federal Photographers Meetings every third Wednesday at 8 p.m. G.S.A. Building, 7th and D Sts., S.W., Washington, D. C.

Binghamton Chapter SPSE Meetings every third Tuesday. Contact H. G. Morse, Ansco, Binghamton, N. Y. RA 2-4221, Ext. 573.

Boston Chapter SPSE Contact John Taylor, Itek Corp., 10 Maguire Rd., Lexington, Mass., VO 2-6200.

Chicago Chapter Biological Photographic Asso. Meetings every third Tuesday. Contact Dorothy Pinkham, 551 W. Grant Pl., Chicago. DI 8-6400.

Cleveland Chapter SPSE Meetings the first Tuesday of each month. Cleveland Engineering & Scientific Center, 3100 Chester Ave., Cleveland, Ohio. Contact Robert E. Birr, General Electric, Nela Park, Cleveland. GL 1-6600.

Industrial Photographers of America Essex House, Newark, N. J. Meetings every second and fourth Thursday. Contact Tom Holbarton, 181 Lake Drive West, Packanack Lake, Wayne, N. J. or R. Handley, The Port of New York Authority, 111 8th Ave., N.Y.C.

Manhattan Chapter Society of Reproduction Engineers Meetings every third Monday. Contact J. Ryerson, Joseph Dixon Crucible Co., Newark 2, N. J. DE 3-3000.

Midwest Industrial Photographers' Association Contact John E. Schrage, c/o Deere & Co., Photo Department, 3300 River Drive, Moline, Ill.

National Visual Presentation Association, Inc. New York City. Meetings every second Thursday. Contact M. E. Shack, 19 W. 4th Street, New York, N. Y. MU 2-2294.

New York Chapter SPIE Meetings every third Thursday. Contact Don Bass, P.O. Box 177, Bethpage, L. I., N. Y. Liggett 4-8196.

New York City Chapter SMPTE Meetings first or second Wednesday of each month. Contact Ed Warnecke, Eastman Kodak Co., 342 Madison Ave., New York, N. Y. MU 7-7080.

New York City Chapter SPSE Monthly programs. Contact Richard H. Haard, Bell Telephone Labs, N.J., CH 3-1000, Murray Hill Ext. 2182.

Rochester Chapter SPSE Second Thursday. Contact Woodlief Thomas, Jr. Color Technology Division, Building 65, Kodak Park, Rochester 4, N. Y. CO 6-2500.

Rocky Mountain Industrial Photographers Meetings every fourth Monday. Contact P H Broadie, 2170 S. Lincoln, Denver 10, Colo. PEarl 3-2200.

Southern California Chapter, Biological Photographic Assn. Meetings every third Thursday. Contact Avis Gregersen Warner, Box 78, 1200 N. State St., Los Angeles 33, Calif. CA 5-3131 ext. 7-1319.

Southern California Chapter SPSE Meetings the last Monday of each month. Contact Ben Augustine, 235 Annandale Rd., Pasadena 2, Calif. Telephone MU 1-0076.

Southern California Chapter Industrial Photographers Meetings every third Tuesday. Contact Janet Marshell, Executive Secretary, 5463 Virginia Ave., Los Angeles 29, Calif. HO 5-6614.

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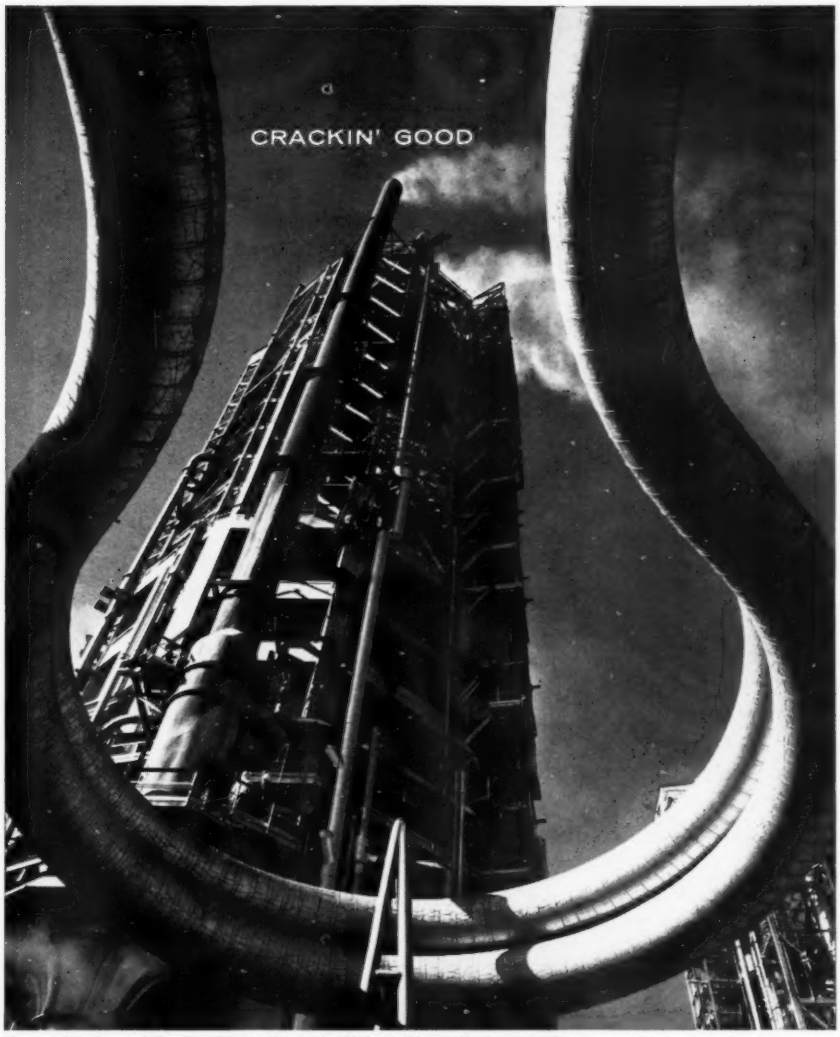

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Industrial photography has emerged in the last several years as one of the most important functions of any industrial organization. Similarly, the need for detailed, long-lasting prints has grown. Try some of the best photographic papers in the business, including: *Varaloid®*, an excellent variable contrast paper most often used in commercial enlarging; *Halobrome®*, a high grade projection paper; *Halex®*, a contact paper especially suited for industrial photography and photo finishing; *Industro®*, a contact paper much in demand for commercial and portrait work.

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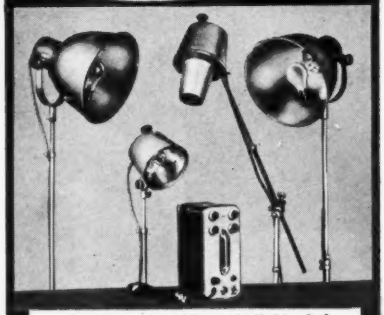

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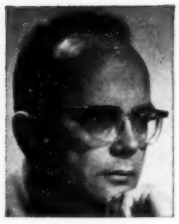

ELECTRONIC FLASH

Ah, blessed relief! Less change, more progress in the new models

Looks as though the electronic flash market has settled down for a while. Only a few new items appeared at the March photo dealers' show in Philadelphia, and these represented refinements and improvements rather than any radical departures. Photographers, dealers, and writers alike may be able finally to make careful comparisons and evaluations on the basis of experience and investigation, without danger of the results being outdated by a program of planned obsolescence.

New ring unit

Industrial photographers will welcome the new ring light offered by Hershey. Called the "Sun-Ring," it fits lenses which take a Series VII adapter or smaller, will handle up to 200 watt-seconds, at up to 900 volts. It has its own internal trigger circuit, permitting Hershey to offer it with a connector for most standard power packs. (Hershey also offers a companion battery-AC pack with 25, 50, or 100 w-s for $59.95 less batteries). This ring light has an excellent reflector and the unit appears to be well designed and constructed. Price is $39.95. A good investment for shadowless work.

Neat monopack

A completely new import offered by Kling Photo Corp. (Linhof, Kilfitt, Gossen, Minox, etc.) is regarded by this writer as the neatest of the monopacks offered to date. Called the Heliotron, its weight is only 1 lb. 2 oz. and its overall length but 5¼ in. The capacitor and battery are contained in the 4-in. oval-shaped handle surmounted by a 3¼ x 3¼ x 2-in. rectangular lamp and control mechanism housing. This very compact package puts out 40 flashes from self-contained rechargeable nickel cadmium batteries with an 8 to 12-sec. recycle time. A most interesting monitor circuit in this completely transistorized unit keeps the voltage at its prescribed 500 volts within plus or minus 2 per cent even when the batteries are almost completely discharged. The control circuit uses an incandescent lamp for a resistance and the light from this lamp serves as a pilot and illuminator for the exposure computer dial. (This energy would otherwise be dissipated as heat.) The Kodachrome (Daylight 10) guide is 35. Price including AC charger and bracket will be under $70.

Heiland Research showed many things of interest ranging from a new model Repronar electronic flash copying device that permits use of any Pentax camera, to spare battery containers so that Futuramic Strobonar users may carry spare batteries installed in the battery trays for insertion in an instant. Those who are always looking for more rapid recycling will welcome the Strobonar 65 B with its 2 to 4 sec. between flashes. One Eveready 487 battery—carried in a leather belt pouch—is said to give some 1000 to 1400 flashes with a Kodachrome guide of 35. The capacitor and reflector are contained in a unit similar to the Futuramic II. A special version of the II is offered with an outlet for the Heiland ring light (called the Proxolite) and is called the Futuramic II model 65 A. A unique accessory kit also available for the Futuramic Strobonars consists of four lens-filter attachments that are held in place over the light source by means of an adapter. One wide-angle lens increases the reflector coverage to a full 70 degrees. Another lens directs light both upward and toward the subject resulting in bounce and fill lighting combination in a ratio of two to one. A neutral density filter cuts the light by four f-stops, and a correcting filter provides the proper correction of Kodacolor film. Users of the Stroboflash II and IV

(*continued on page 18*)

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ELECTRONIC FLASH

(*continued from page 16*)

now have another 225-volt battery available. Bright Star announces its No. 39P at $9.95 list, which is interchangeable with Eveready 489.

Buzzy signal

U.S. Photo Supply introduced its new PCA X-90 monopack electronic flash unit completely self-contained with an "Electronic Ear" monitor circuit to give an audible signal indicating the unit is at its proper operating voltage. Giving 125 flashes from its rechargeable nickel-cadmium battery, the unit has an 8 to 13-sec. recycling time. Batteries are interchangeable to permit continued use. Weight is but 32 oz., yet guide numbers of 30 to 35 are available from the 45 watt-second unit with regular Kodachrome and 40 to 55 with a 45 w-s booster handle. The unit features a printed circuit and transistor power oscillator, as well as a built-in charger and AC operation. Price is $75.

Divide and conquer

Scheibe Engineering showed its unique "Producer 400" which features four separate and complete packs in one case for the production photographer who cannot risk the consequences of equipment failure. This four-100 w-s pack features voltage control with meter, high and low intensity switch, and the use of semiconductor switching rectifier in place of the trigger tube. The latter feature is unique, but is sure to be incorporated in most makes as the price of the semiconductor decreases.

Metz had added an interesting accessory power supply for its Mecablitz 106 or 107 monopacks. The "Metz-Pak" is a small accessory case holding four D-size dry cells providing some 500 flashes from the Mecablitz in the event that the nickel cadmium batteries become exhausted. The cord and case is only $4.95 less batteries.

Kalimar, distributed by Arel, has restyled and physically improved its units. A ring light is now available for only $24.95.

Nikon demonstrated a new flash unit for its electric motor drive device. The flash is designed to give a 30 to 35 regular Kodachrome guide with a three per sec. flashing rate. This is an AC-powered unit and was demonstrated with a five-channel wireless remote control that gives reliable operation at ⅛ of a mile.—THE END

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MAKE DUPLICATES OF ORIGINAL 35mm TRANSPARENCIES, CORRECT FOR EXPOSURE ERROR, AND CHANGE COLOR BALANCE

With the Heiland Repronar, you can make any number of duplicates from an original transparency quickly and easily. If the original picture was incorrectly exposed, it can, in most cases, be corrected with remarkably good results. Color balance can also be corrected or improved by using color correction filters, and many ordinary pictures can be transformed into outstanding ones by changing the color balance with the Repronar.

Underexposed

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Color Change

MAKE BLACK AND WHITE NEGATIVES FOR PRINTS FROM ORIGINAL TRANSPARENCIES

By choosing the proper film, black and white negatives of excellent quality can be made from color transparencies with the Repronar. Then, your favorite color slides can be made into striking black and white prints in any size and quantity you desire.

Transparency

B&W Negative

B&W Print

Original

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It's easy to reduce 2¼ x 2¼-inch or other size transparencies to 35mm with the Heiland Repronar, and by simply changing the position of the original to be copied, you may choose either horizontal or vertical format for the copy. If you use several cameras with different formats, the Repronar allows you to standardize the size of your transparencies, and, in addition, you can improve the composition of many pictures by reduction to 35mm.

freedom in COLOR
you've always enjoyed in black and white

Original

Cropped

Original

Cropped

CROP AND ENLARGE PORTION OF ORIGINAL TRANSPARENCIES

Cropping and enlarging can greatly improve the composition of many transparencies, or you may want to enlarge just a portion of the original. With the Heiland Repronar, it's easy to crop out undesirable areas from a photo, and thanks to the Repronar's high-quality lens, razor sharp enlargements of up to 4 times may be made from your original transparencies. In addition to enlarging a portion of a transparency, you may enlarge a 35mm stereo frame or a frame of 16mm movie film to 35mm size for projection along with your other slides.

PRODUCE AND DUPLICATE 35mm FILM STRIPS

By using the Filmstrip Slide Holder provided, filmstrips for projection are easily prepared on the Heiland Repronar from any series of horizontal format 35mm transparencies. By using the Filmstrip Duplicating Assembly, available as a Repronar accessory, you can rapidly duplicate filmstrips in any quantity.

Original

Special Effect

CREATE SPECIAL EFFECTS

The number of special effects which can be created with the Repronar is limited only by the user's imagination. You can add textures and screens, create montages and vignettes, add masks for comic or dramatic effects, make titles, tilt the composition, and improvise many other unusual effects from your transparencies with the aid of the Repronar.

MAKE COLOR NEGATIVES FOR COLOR PRINTS FROM ORIGINAL TRANSPARENCIES

Original

Color Negative

Now you can make your own color negatives from original transparencies, simply by loading the Repronar's camera with negative color film. From your color negatives, large, dramatic color prints may be made—prints which capture all the detail and color of the original slide.

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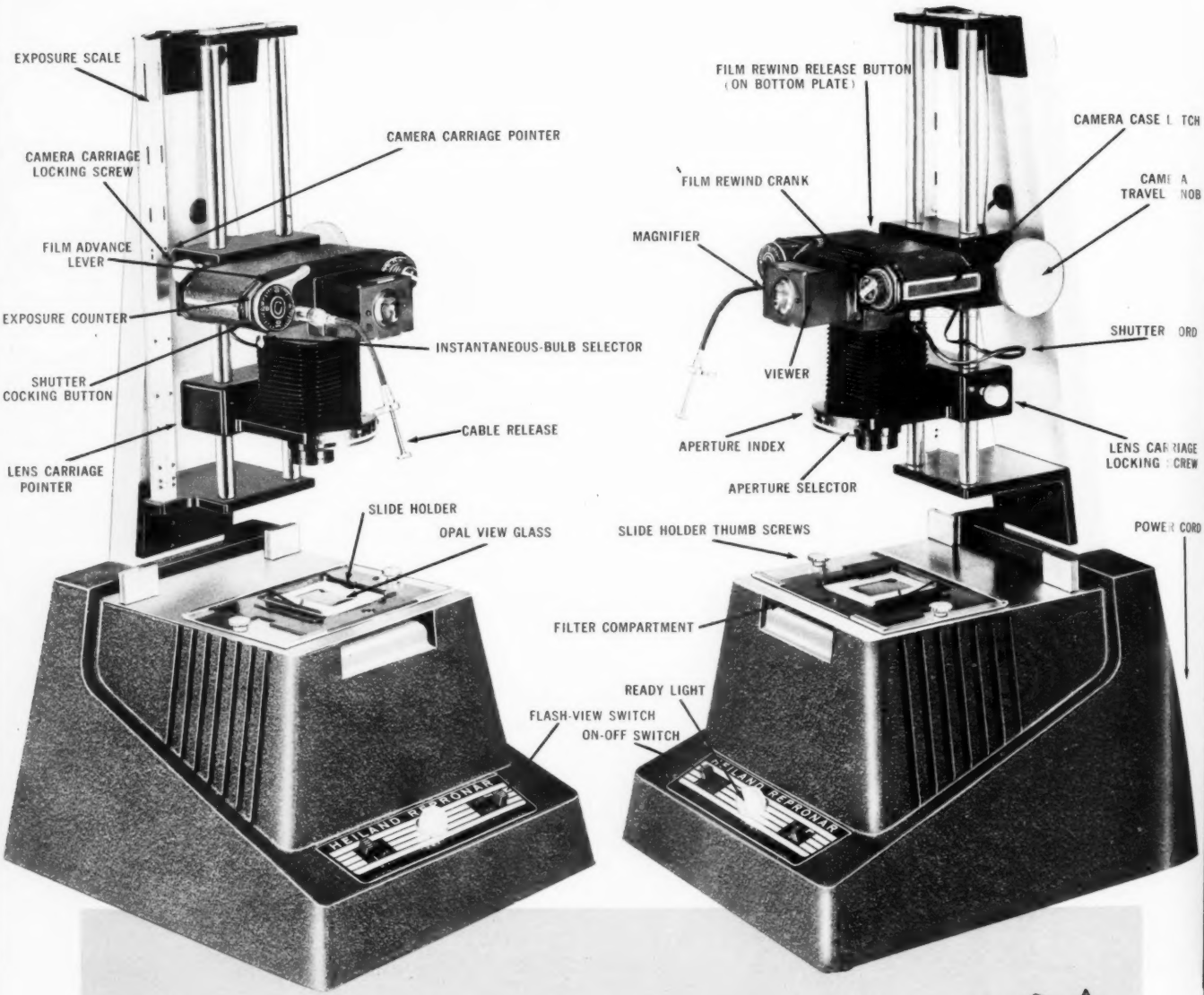

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To allow you to duplicate the Repronar processes described on this sheet, as well as others which you will devise, the following accessories are furnished: (A) Filter Holder; (B) Slide Holder Magnets; (C) Single Frame Film Strip Slide Holder; (D) 2-Inch Slide Holder; (E) 2¼-inch Slide Holder; (F) UV-17 Filter; (G) 81A Filter. Furnished, but not shown, are a Lens Cap and Dust Cover. Film Strip Duplicating Assembly (H) is available as an accessory. For additional information on the Repronar, contact your nearest Authorized Heiland dealer or write:

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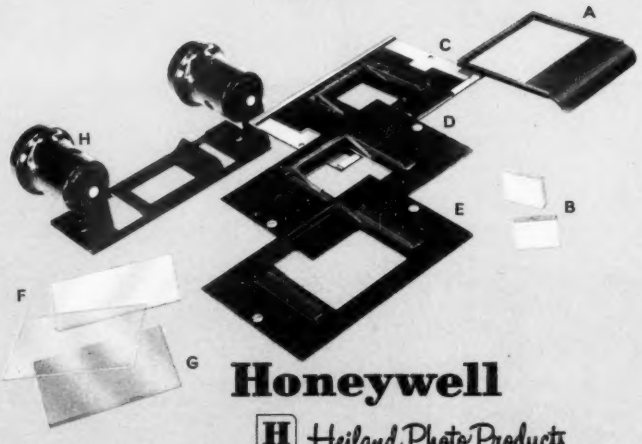

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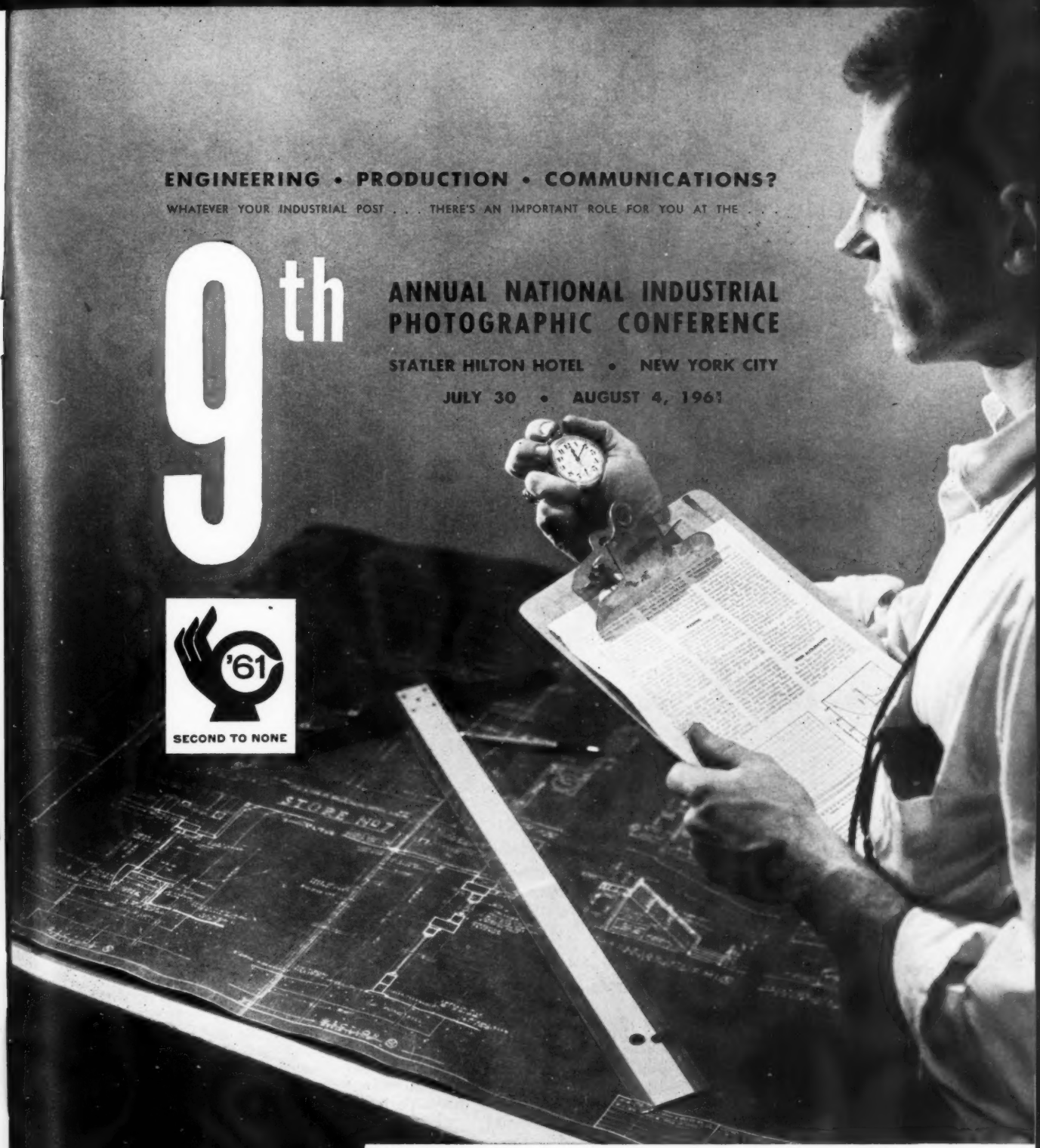
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Arnold Eagle

INDUSTRIAL MOTION PICTURES

New wave film makers kiss off the slavishly traditional techniques

The so-called "new wave" in the film world has been occupyng a great deal of attention recently. One hears a lot of talk and controversy about the young, rebellious film makers who are functioning all over the world. Some of them have ventured into feature film making for the first time without much direct experience with feature films. They have been breaking the traditional rules and upsetting tried and true methods. They are producing feature length films with unheard of low budgets and creating furor generally in the cinematic world. Most of the critics acclaim them as geniuses who are bringing new life into a stagnating art. Some hold their noses and yell "Garbage!" But whatever the opinion, the "new wave" cannot be ignored; it will surely influence the future of motion picture making.

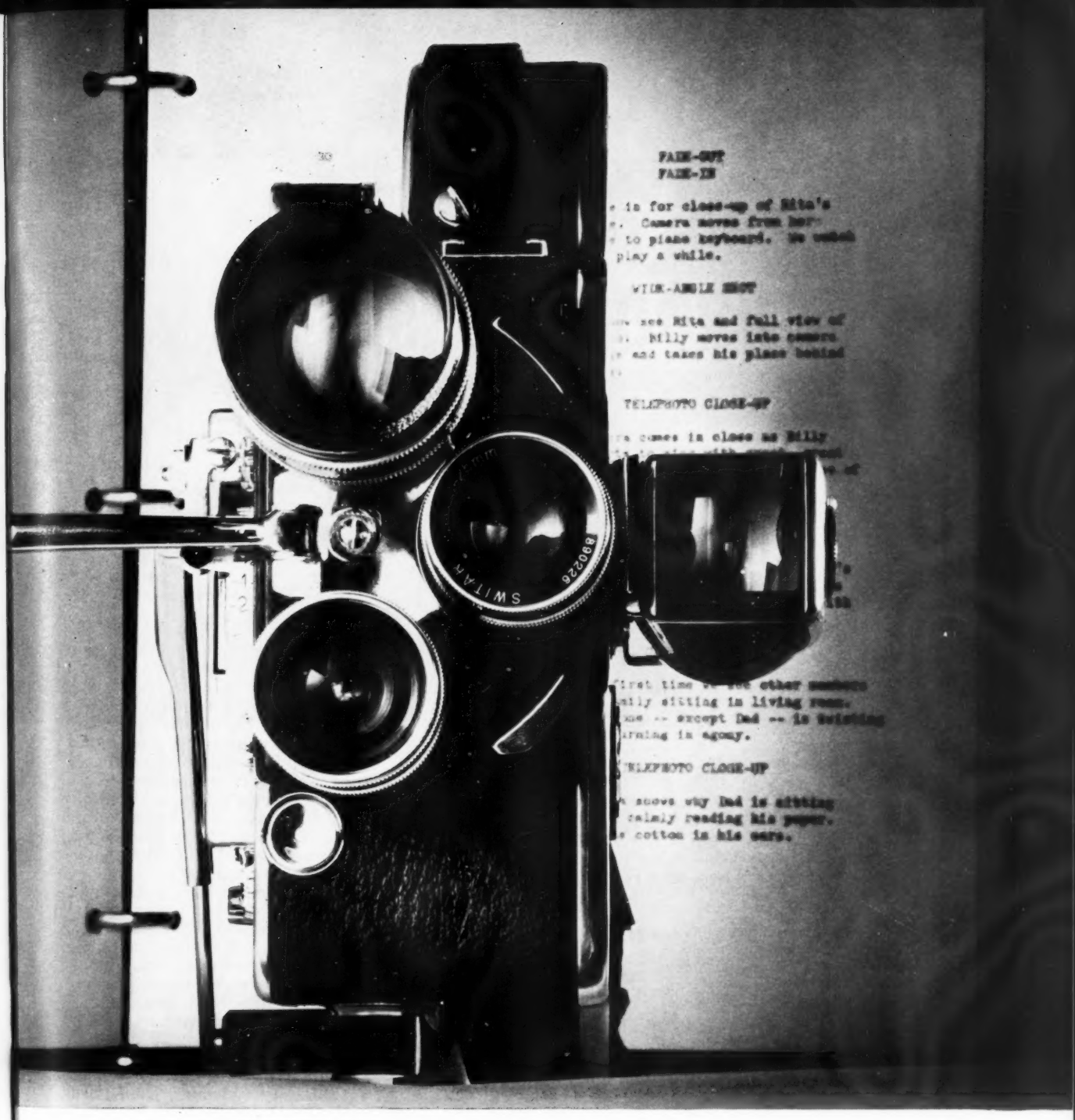
Realism over slickness

These new film makers have one thing in common—they are striving for greater realism on the screen. Following in the footsteps of the Italian neo-realists Rossellini (*Open City*), and Vittorio De Sica (*Shoeshine Boy*); our own Sidney Meyers (*The Quiet One*) and Morris Engels (*Little Fugitive*), they are trying to create a penetrating realism that is uncompromising and believable. The camera becomes a ruthless observer that sometimes cannot be bothered by such nuisances as sharp focus, good lighting and a steady camera. Sometimes even parts of the sound track are unintelligible. While some viewers may be irritated by these crude techniques, they cannot help feeling the over all deep penetrating emotional impact of these films. Even those whose reactions are negative cannot deny the profoundly moving effect. A slick Hollywood concoction may keep the viewer entertained and even hold his attention for an hour and a half. But it is all too often completely forgotten the next day; nothing remains. This is not the case with films that approach their subject with a greater visual honesty, despite their rougher techniques—or maybe because of them. I am thinking of Satyajit Ray's unforgettable trilogy—*Pather Panchali, Aparajito,* and *The World of Apu.* Few people will forget the little boys who appear in Sidney Meyers *The Quiet One,* Morris Engel's *The Little Fugitive* and De Sica's *Bicycle Thief.* Regardless of your intellectual opinion of such recent films as *Hiroshima Mon Amour* (Alain Resnais); *Breathless* (Jean-Luc Godard); and *Shadows* (John Cassavetes), they will linger in your memory. Whatever your judgment of the cinematic story construction of Bert Stern's *Jazz on a Summer's Day,* you will never forget Mahalia Jackson's face as she sings the Lord's Prayer; or the candid portraits of the listeners at the Newport Jazz Festival; or the unposed detail of a singer who pauses to straighten the seams of her stockings before she ascends the podium. These films appeal to us on many levels. Some satisfy a voyeur instinct in us (the peeping Tom complex). This is one of the reasons for the huge success of Allen Funt's *Candid Camera* television program. More important, however, they make the viewer more than a front seat spectator: they make him an emotional participant.

Equipping the rebellion

The "new wave" in film parallels a development in magazine photography: the candid, available light 35mm shooting. Subject matter and emotional impact are the only concerns of the picture editor. This has been a natural outgrowth of the precise, quick handling, wide maximum aperture miniature camera technique. Similarly, the development of lightweight, versatile, professional cameras laid the ground

(*continued on page 26*)



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With all its professional features, Bolex's H-16 Rex is only $450 with a superb Lytar F/1.8 lens. Bolex accessories are also moderately priced—the Rexofader, for example, is just $37.50. For detailed literature write D 3PM-5 or see your Bolex dealer for complete information.

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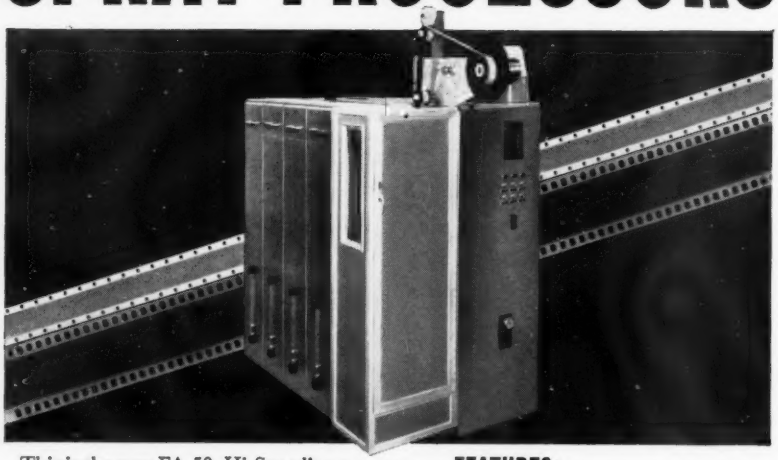

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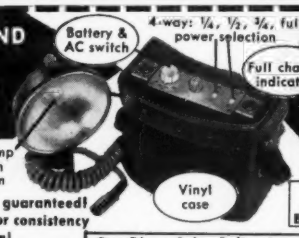

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HICO CORPORATION

761 Coolidge Hill Rd., Watertown 72, Mass.

Get more information. Circle 442, page 79

IND. MOTION PICTURES

(*continued from page* 24)

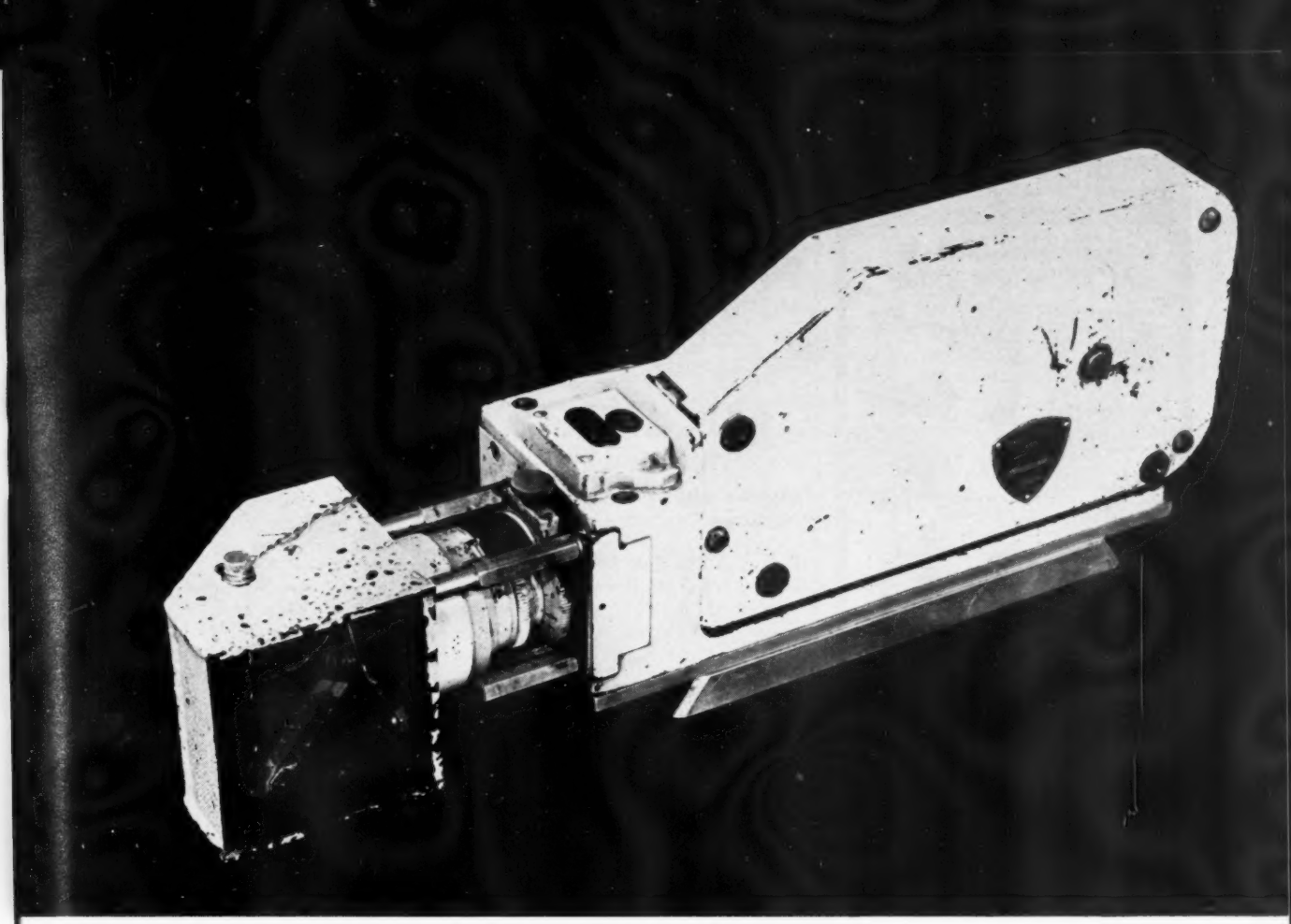
for "new wave" cinematography.

Notable are the Arriflex cameras, both 16 and 35mm. I remember how excited the late Robert Flaherty was in 1948 when he obtained one of the first 35 Arriflexes from Irving Brown of Camera Mart. He said, "This is just the camera I have been dreaming of all my life." He was sure it would completely revolutionize the movie industry. (He was an incurable optimist, with great faith in man's ability to change by using logic.) He felt that the Arriflex would free the film maker from the cumbersome equipment that he had to wear like chains, shackling him to the studio. He believed that this mobile instrument, capable of being used instantaneously, would make it possible for the film maker to go among people in the places where they lived, and then record their lives honestly. He always felt frustated by the mechanical intrusion of big heavy equipment into the reality of a scene. He was very happy with this camera which he said is like an "extension of the human eye." Some of the documentary film makers followed Flaherty's lead, but most professional feature film makers were shocked by Flaherty's "recklessness" in the use of so unorthodox and then untried an instrument for a feature film (*Louisiana Story*). His case was proved when the film won international acclaim.

Lately, the picture is changing. Independent film producers are moving their locations away from Hollywood; and more and more film makers are using natural locations for their productions. They are trying lighter and more mobile equipment for their shooting.

Flaherty Seminar

The seventh annual Robert Flaherty Film Seminar will be held this year in Puerto Rico from June 23 to July 1. It is sponsored by the newly organized International Film Seminars Inc. Many United States and international film makers will show and discuss their films. The seminar will be held, and the participants housed in the beautiful and isolated Barranquitas Hotel. Because of the limited accommodations of the hotel, those who wish to go should make reservations now. Write to International Films Seminars Inc., 1125 Amsterdam Avenue, New York 25, N.Y. *Hasta la vista* in Puerto Rico!—THE END



BEAUTY

This is the way we like to see the Photo-Sonics 16mm-1B high speed prism camera — well used. This one has made 16 trips aboard a rocket-powered sled on one of the nation's major test tracks, traveling a total of about 60 miles in less than 4 minutes, which is traveling. It took clear, sharp pictures at 1,000 frames per second every time.

Whether gleaming white and showroom fresh, or showing the scars of hard usage, this camera represents a new breed of high-speed optical recorder. It combines the simplicity and dependability of continuous motion prism camera (it's loafing at 600 frames per second) with the sharpness and image-stopping quality of an intermittent camera.

Operating speeds of 12 to 1,000 frames per second. Film capacities of 100, 200, 400, or 1,200 feet. Let us show you one of these beauties tomorrow. *It's the BEST high-speed camera in the world!*

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Get more information. Circle 502, page 79

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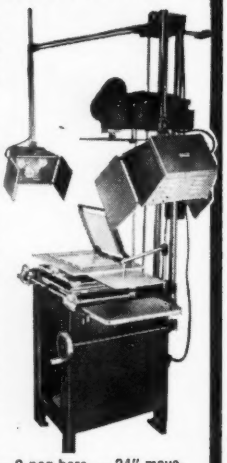

Specifications: 60" zoom — manual wheel ½" per rev. — 1-18 field — ground steel 2" columns — welded steel base. **Camera carriage** interchangeable for movies, stills, enlarging, copying, projection. Capacity 70 lbs. **Compound** — NSEW movement driven by lead screws with hand cranks — NS 14" — EW 18" — 1/10" counters on all cranks. **Table Top** — 18"x24" — 2 peg bars — 24" movement, 1/20" scale. 360° rotation with ½° scale. Spring-loaded platen with self-leveling water white glass. **Pantograph** — attached, right side up. **Underneath Light Box** — with 4 sockets — opal glass. **Shadowboard** — on single post swivel. **Top Light Bracket.**

Accessories available include motorized zoom, floating peg bars, dovetail camera mount, 4x5 copying and enlarging head.

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MULTI-PLANE TABLE
for 3 dimensional animation — 4 levels optically flat water white glass—24"x33"x¼". Each level independently adjustable—slides freely on rails. Stops provided on each level.
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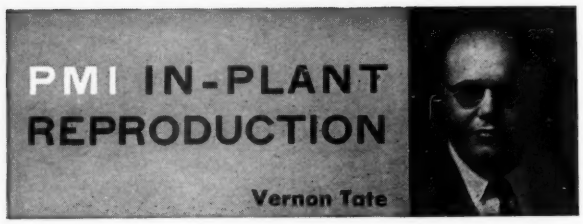

MICROREPRODUCTION

Finding what we already know—no longer an academic problem

In his book *The Scholar and the Future of the Research Library*, published in 1944, Dr. Fremont Rider confronted the academic world with some rather shocking predictions. On the average, he stated with carefully assembled statistics to back up his assertions, that research libraries regardless of size tend to double each 16 years. As an example, Yale University in 1831 held 23,500 volumes; in 1938, 2,748,000. Projected a hundred years into the future, on this basis the Yale library will contain 200,000,000 volumes which will occupy something over 6,000 miles of stack shelves and require a card catalog, if this now standard method of library control still persists, with 750,000 card drawers which will occupy not less than eight acres of floor space. In order to check the validity of Dr. Rider's argument the writer checked the present holdings of Yale University library. As reported in 1958, they amounted to 4,309,882 volumes. This is less than the prediction, but perhaps the war years cramped Yale's style, and the figure is large enough to warrant some concern and serious thinking.

One way out

Dr. Rider's suggested remedy was the Microcard® which condenses printed material to the size of a 7.5 x 12.5 cm library catalog card. These opaque base microreproductions have gained considerable acceptance. In his *Guide to Microforms in Print* which has just been published by the Microcard Foundation, Albert M. Diaz records some 10,000 titles representing many times that number of volumes from the offerings of 41 microform (microfilm, microprint, etc.) publishers. The *Guide* required 72 closely printed double column pages for the listings.

Libraries represent deposits of information which are regularly mined on an ever increasing scale. Their housing costs alone are formidable; costs of service are equally great, yet much of our civilization depends directly on this mountain of paper.

The important thing is that records of all types are increasing at the same or even an accelerated pace. Libraries or library-like activities permeate every human activity: business, industry, education, government, law, medicine or any profession, trade unions . . . name the activity and see if it can function without records. Even the individual must keep or have kept for him records that are now vast and complex and which each day seem to grow in complexity.

Money and means

Lest the structure of civilization grow so weighty as to sag or topple the entire edifice, money in respectable amounts and thought by individuals of real competence and great ingenuity have been and are being devoted to theories of documentation and to practical means for controlling the colossus, indeed toward making him work for his keep.

A great deal has been said in this column about microphotographic reproduction of documentary originals as a part of documentation control and utilization. One admonition underlies every statement made and development reported; it can bear repetition: Microphotographic reproduction is never an end in itself but only a means to an end. Once the end is visualized, then the means can be studied, tailored and applied to the particular need in view.

Despite their admitted value, research libraries generally—whether academic, scientific or public—are in reality poor candidates for the acquisition of highly developed and therefore initially costly mechanized data handling equipment. Such libraries are traditionally operated

(*continued on page 30*)

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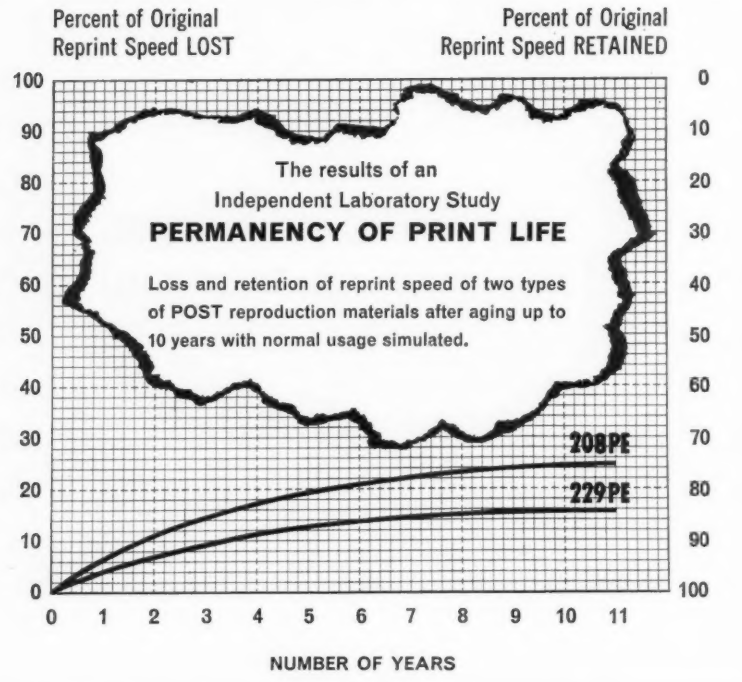
Get more information. Circle 444, page 79

REPRODUCTION TRENDS



The graph above is an interpretation of independent lab reports demonstrating the relative permanency of Post sensitized materials.

Independent Lab Tests prove permanence of Diazo and wash-off films

Why research? The extremely rapid development of diazo technology has actually outpaced the industry's ability to put in its customers' hands complete information on the multitude of improved sensitized products now available.

What's new? Because of the outdated conception, held by some, that the diazo process produces only cheap, throw-away prints, Post retained an impartial, independent testing concern to verify the life expectancy of Vapo Tuf-Tex (diazo) and ReproTrace (wash-off) polyester films, which are used frequently as reproducibles or "duplicate originals."

Ten years of simulated use? Procedures involved accelerated aging, filing, refiling, as well as print runs of varying length and speed. Tuf-Tex and ReproTrace proved well able to maintain an effective degree of image density under trying conditions.

Proof of the testing. For your copy of the complete folder detailing conditions and results of these first impartial tests, plus an additional free Post Selector Chart of Diazo Materials, write to Frederick Post Company, 3660 North Avondale Avenue, Chicago 18, Illinois.

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MICROREPRODUCTION
(*continued from page 28*)

with subsidies of some sort and are geared to provide enormous amounts of "free" service along well established lines. It is only in a governmental agency, in business, industry or some like activity where, by contrast to the research library, concrete dollar savings or profits can be shown through the utilization of high-speed data handling machinery that these devices have much of a chance for full scale trial and hard-headed appraisal.

A starting point

Library problems, however, and library practices which have developed over the centuries do provide an excellent vantage point for study. Consider for example the following book just published by McGraw-Hill, *Retrieval Guide to Thermophysical Properties Research Literature,* Volume I, edited by Y. S. Touloukian. It will permit the user to search 1,210 journals, reports, books, etc., for references to 10,000 articles containing information on seven specified thermophysical properties of 14,240 substances. Volume I in small folio format, double column, is complete in three books containing respectively 169, 372 and 1250 pages; it weighs over 14 lbs. Could this title have been produced in microform arranged for machine searching? It probably could. Will titles of this type become grist for the high-speed data searching techniques? They probably will, and the machine will provide not only the complete reference but a copy at need of the text of the reference as well. This can be bibliography in the future, the near future it is to be hoped.

(*continued next month*)

WHAT?

What's in the PMI DIRECTORY? Names and addresses of manufacturers and services . . . products and equipment . . . trade names . . . all types of services . . . the famous PMI charts . . . and other helpful and useful information. The second edition of the PMI DIRECTORY will be published this fall. You can get it absolutely FREE by subscribing now to PMI at only $5.00 per year, 2 years for $9.00, 3 years for $12.00.

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Gevapan 30 (ASA D64 T40) offers moderate speed, fine grain. Exceptional gradation and panchromatic range.

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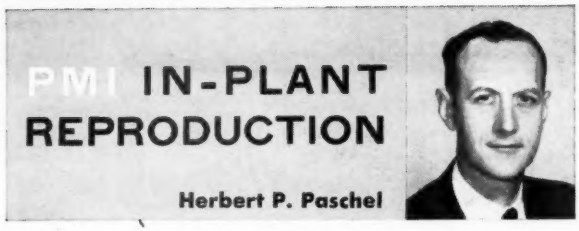

GRAPHIC ARTS

DTR camera-processor turns out duplicator plates in a jiffy

Almost a year and a half since the prototype model was discussed in this column (November 1959), the A. B. Dick Photoplax Camera-Processor has finally reached the market. This is a completely integrated plate-making machine for producing aluminum offset plates in two minutes. The unit combines a magazine for dispensing the sensitive negative material, a reducing and enlarging process camera, and a plate-processor that automatically unites the exposed negative paper with the image-receiving aluminum plate. Aside from pushing buttons and winding cranks, the only manual operations required are loading and removing copy, inserting the aluminum plate and peeling the negative paper from the plate.

All of the operations described are performed under ordinary room lighting since the Photoplax Camera-Processor is completely light-tight. Even loading the magazine with a 350-foot roll of negative paper can be done under normal room lighting conditions.

Pushing the buttons

Operation of the unit is simple. Copy for the camera is positioned on the copyboard, and a blank aluminum plate is inserted in the processing section. Following adjustment of the focusing controls, negative paper is cut to size within the magazine, forwarded to the camera, exposed and transported to the developing section. Here it is brought into contact with the image-receptive aluminum offset plate. The negative and plate are then automatically passed through an appropriate developing solution and squeegeed together in intimate contact. While in contact a positive image is transferred from the negative to the plate. When the plate has been completely imaged it emerges from the processor automatically. Simple conditioning and lacquering prepares the plate for immediate running on an offset duplicator.

That old DTR magic

The basis of the Photoplax system is the diffusion-transfer-reversal process, better known as the one-step photographic process. Other well known systems utilizing the same principle are the Polaroid Land Camera, Gevacopy (Gevaert) and Copyrapid (Agfa).

The processor will make offset plates up to 10¾ x 18½ in. The camera section permits reduction and enlargement from 50 per cent to 200 per cent, positioned by means of calibrated percentage focusing scales. A glass covered copyboard accommodates originals up to 18 x 23 in. The lens is a special 8¾-in. wide-angle Goerz Dagor f/6.8 which, at f/16, has a usable field angle of 70 degrees.

The camera can be used for regular film photography, independent of the platemaking facilities of the equipment. By means of an accessory item, a vacuum back film adaptor, it becomes possible to make line, halftone and continuous tone negatives on a wide variety of sensitized materials—films, papers, tracing cloth, etc. Halftone negatives can be made with ease on Autoscreen film—with some adaptation, it should be likewise possible to make halftones using contact screens. The use of this adaptor requires a separate darkroom for loading and unloading the holder and processing the exposed material. For its normal use as a platemaker no darkrom is needed.

The processor is not confined to platemaking alone, even without the auxiliary equipment. By substituting other receiving materials for the aluminum plate it becomes possible to make office photocopies on paper, or positive film intermediates for use with diazo systems. For the occasional paper or film

(*continued on page 34*)

fits top performance and versatility into tight budgets.

The Yashica Pentamatic is an outstanding 35mm reflex, and an outstanding camera value. With its interchangeable high quality lenses and special accessories it offers you the versatility and performance of the finest professional equipment—at less than half the price you'd expect to pay.

55mm f1.8 lens has automatic stop-down diaphragm—Pictures or slides taken with the Pentamatic will instantly impress you with the critical sharpness and color definition of the Auto-Yashinon f1.8—at all apertures. It is a lens of unusual optical quality, and is equipped with automatic stop-down diaphragm which permits focusing and viewing at full aperture.

pentaprism eyelevel finder and automatic return mirror — The Pentamatic finder has a bright, clear fresnel screen and matte spot for ease in focusing and viewing. An automatic return mirror eliminates image blackout following the exposure.

focal plane shutter and other camera features — Shutter has non-spinning speed selector dial which may be set at any speed from 1 second to 1/1000th—or in between. Other features include: X and FP flash synchronization; single-stroke film advance lever simultaneously reopens lens diaphram and sets shutter; hi-speed rewind; offset body release; ASA and load indicators.

interchangeable lenses and accessories for added versatility —There are six interchangeable Super-Yashinon wide angle and telephoto lenses: 35mm f2.8, 100mm f2.8, 135mm f2.8, 135mm f3.5, 180mm f3.5 and 250mm f4—with preset diaphragms. Accessories include: special rings for Exakta and Praktica-mount lenses; copy, close-up and microphoto equipment; oscilloscope adapter; lens hoods; and a complete assortment of optical glass filters.

Let your Yashica dealer show you the Pentamatic and tell you how little it costs to own one. See him soon!

YASHICA

Get more information. Circle 505, page 79

PENTAMATIC

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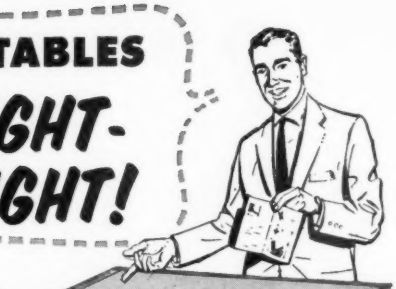

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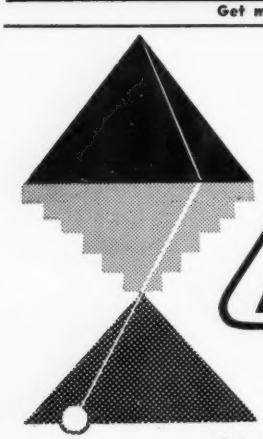

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(*continued from page* 32)

copy by the DTR method, no changes are required. But if large quantities of paper or foil prints are to be made the standard paper developer should be used. The latter extends the keeping quality of the finished print and is somewhat more economical too.

For quantity photocopyng at same size by contact exposure—either reflex or shoot-through—the standard office photocopyng machines are more efficient. The enlarging-reducing feature of the Photoplax Camera-Processor however makes it advantageous where a change of size is required.

The obvious flexibility of this equipment and process makes it of extreme interest to those who want an integrated, semi-automated offset platemaking system with a potential for other functions. Compactness is another advantage—the unit occupies an area less than 22 sq. ft.

Those who already have camera and darkroom facilities can easily adapt to the Photoplax system by adding the Photoplax Darkroom Processor, Model 165. This compact, portable unit is based on the same principle as the developing section of the Photoplax Camera-Processor. The negative paper is exposed in existing equipment and then processed together with the aluminum plate in the Model 165.

Prices are as follows: Photoplax Camera-Processor Model 175, $4,-700; Photoplax Darkroom Processor Model 165, $125; Vacuum Back Film Adaptor Kit 81-1751, $230.

Material costs to make a 10¾ by 18½ plate are approximately 70¢; material costs of a 10 x 15½ plate are approximately 65¢.

Color key

Among other new items recently introduced is the 3M Color-Key Proofing System. This is a method for creating colored images on transparent plastic for a wide variety of applications. Foremost among its anticipated uses is color-proofing halftone separation negatives.

The material consists of pre-sensitized, light sensitive colors coated onto .002 stable base polyester films. The films are exposed in a vacuum frame to a light source having a high ultra-violet content. The image is then developed with a single solution.

Ten colors are currently available in sheets 10 x 12 in. and 20 x 24 in.—THE END

If your camera...

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give you critical ground glass focusing and composing—direct, accurate, and full size.

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Get more information. Circle 436, page 79

How professional should a camera be?

How much camera should a pro invest in?

First, it depends on the features he needs. If he's like most pros he can't begin to itemize the hundreds of different types of jobs he handles—everything from portraits to microphotography. In the long run he might wind up buying half a dozen "specialized" cameras to fill his requirements.

The single lens reflex Hasselblad eliminates this. With *one camera*, plus interchangeable accessories, you can get over 100 combinations, and set up in seconds for practically every shot known to photography. Four different lenses, three film magazine sizes plus a sheet film holder, four types of viewers—everything changes. The Hasselblad makes it absolutely needless to carry more than one camera on an assignment.

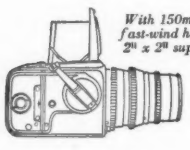
Next, a pro wants quality. How much? Enough to guarantee him perfect results under any circumstances. After all, his living depends on it.

Take the Hasselblad lenses. No scrimping on quality here! Each one is made by Carl Zeiss and has its own Synchro-Compur shutter and automatic diaphragm. Resolving powers permit greater enlargements than virtually any other lens made. For studio work, *color and detail is up to the best you ever got.*

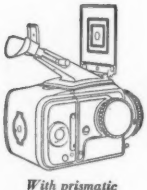
The precision single lens reflex system, of course, completely eliminates parallax. Focus and depth of field appear on the print-size ground glass just as the film will take them. A pop-up magnifier allows you to focus accurately on minute details. There are no surprises waiting for you in the darkroom with a Hasselblad.

Even the ***"conveniences" on the Hasselblad,*** the EVS system, automatic diaphragms (which can also be set manually), and automatic safety devices are to make assignments easier and free you to concentrate on the job. When you use an instrument every day, you have a little convenience coming to you.

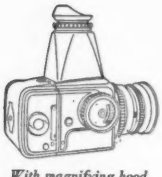
How professional should a camera be? As professional as a Hasselblad, *no less.* With Zeiss Planar 80mm f/2.8 lens, $549.50, including F.E.T. Write Dept. HPM-5 for literature and the name of your nearest Hasselblad dealer. PAILLARD Incorporated, 100 Sixth Ave., New York 13, New York.



With 150mm lens, fast-wind handle, 2¼ x 2¼ superslide back



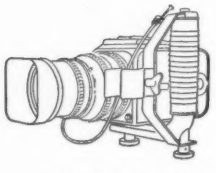
With prismatic sports finder



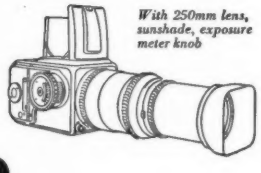
With magnifying hood, 60mm lens, back for 16 1⅝" x 2¼" exposures, exposure meter knob

With sports finder, camera grip, 80mm lens

With magnifying hood, cut film adaptor and holder



With 150mm lens, sunshade, flash gun bracket, back for 12 2¼" x 2¼" exposures



With 250mm lens, sunshade, exposure meter knob

HASSELBLAD

Get more information. Circle 479, page 79

AN EDITORIAL

AMATEURS PREFERRED?

The irony in the discussions of gaining professional recognition for photography in industry is that photographers seem unwilling to take the action most likely to promote their occupation to the professional level: hiring professionally trained men. A number of photo managers —and we would guess that they are typical—state that they consciously avoid hiring men trained in photography, preferring the amiable sort who can be trained on the job. ■ Some of the reasons for this preference are valid, others, not. One unanswerable reason is that there's no opportunity to utilize advanced training. But on the face of it, this speaks for a limited-purpose department, not to mention a limited-purpose department head. Another is the protest that, while professionally trained men want a higher salary than their untrained counterparts, their training is likely to be too broad and general to impart expert skill to the jobs at hand. In other words, they have to be trained anyhow. This reasoning is shortsighted. It neglects the value of training plus experience. ■ Whatever the reasons, the fact is this: The person with the worst numerical chance of employment in an in-company photographic service department is the man with formal professional training in photography. ■ There is no dearth of training. Some 400 colleges and universities offer courses in photography, and all teach related fields such as art, physics, chemistry, engineering, management. ■ Proprietary trade schools abound, while at least a few junior colleges offer two-year programs in this area, e.g., State University of New York's Farmingdale curriculum in photo equipment technology and Michigan's Ferris Institute program in reproduction. ■ Lest our staffers and advisors be down our throats we had best mention the Art Center School, Los Angeles, for illustration, Columbia for graphic science, Rochester Institute of Technology for all phases of photography and UCLA for cinematography and photo instrumentation. ■ Does the school of hard knocks and stained fingers always produce the best alumni? We can't believe it.

The Editors

TRANSPARENCIES TO COLOR

Sooner or later every photographer is plagued with the job of duplicating color transparencies. When the negative-positive color system finally arrived, we had reason to feel that this chore would rapidly become a thing of the past. But we reckoned wrong. If anything, the problem has become worse instead of better, but in a different way. Along with our new found ability to make excellent color prints quickly and inexpensively has come the demand to make color prints from our existing color files. The only trouble is that the files are full of transparencies, not color negatives.

At first sight this did not seem too much of a problem. All we had to do was shoot a copy on color negative and we were in. But we were wrong there too—it isn't that simple.

The very act of copying a transparency is based on a false premise. It is presumed that because a transparency looks like an exact representation of the original scene, that it is just that. But it is not. First, a transparency provides an exaggerated representation of the brightness range; and second, no matter how accurate they may seem, the colors are only a close approximation of those in the scene itself.

The reasons for this are complex, and though the following explanation is oversimplified, it at least makes the main point.

Colors reflected from the original scene are recorded on a color emulsion as proportionate amounts of cyan, magenta and yellow dye. The function of these dyes is to act as absorbers of red, green and blue light respectively. Since all of the dyes used in color emulsions are imperfect to a degree, each is less efficient than it should be. Both cyan and magenta absorb appreciable quantities of the colors that they should transmit. As a consequence, blues and greens are often rendered much darker than they appear in the original scene. Every transparency, therefore, carries within itself the seeds of color degradation in the duplicate.

The dyes in the emulsion of the color print material are no more efficient than those of the transparency. As a result, when a copy is made, the same effect occurs for a second time. Blues and greens grow darker still, and reds shift toward orange. To further complicate the problem, the duplicate print picks up additional contrast along the way, with the result that highlight detail burns out and the deeper shadows block solid. The whole effect is enough to shock even the most hardened color campaigner.

Two problems have to be licked if the color print from a transparency is to be worth the labor and expense of making it. Contrast must not be allowed to become excessive and hue shift must be minimized. And since these are two distinct, but related maladies, treating one without the other will only effect half a cure, if that.

Most of the remedies that have been tried with varying degrees of success have had to do with contrast. Only those techniques that provide for masking of the transparency will have any effect at all on hue shift. Then why don't Ektacolor and Kodacolor films, with their built-in masks, provide first class duplicates of colored originals? It is, of course, a fair question, and is answered by Kodak itself on page 47 of its data book *Printing Color Negatives.*

"Since the colored couplers in the internegative film (Ektacolor type "L" is mentioned) provide no correction for the dyes in the transparency, masking of the transparency is recommended."

It would seem that the built-in masks in these films serve only to minimize hue shift in the print material. This, in itself, is a useful enough attribute, but it does not correct for the original color shift in the transparency. Nor does it help to control contrast. It now becomes obvious why methods of

EQUIPMENT USED IN THE TWO-MASK INTERNEGATIVE PROCEDURE

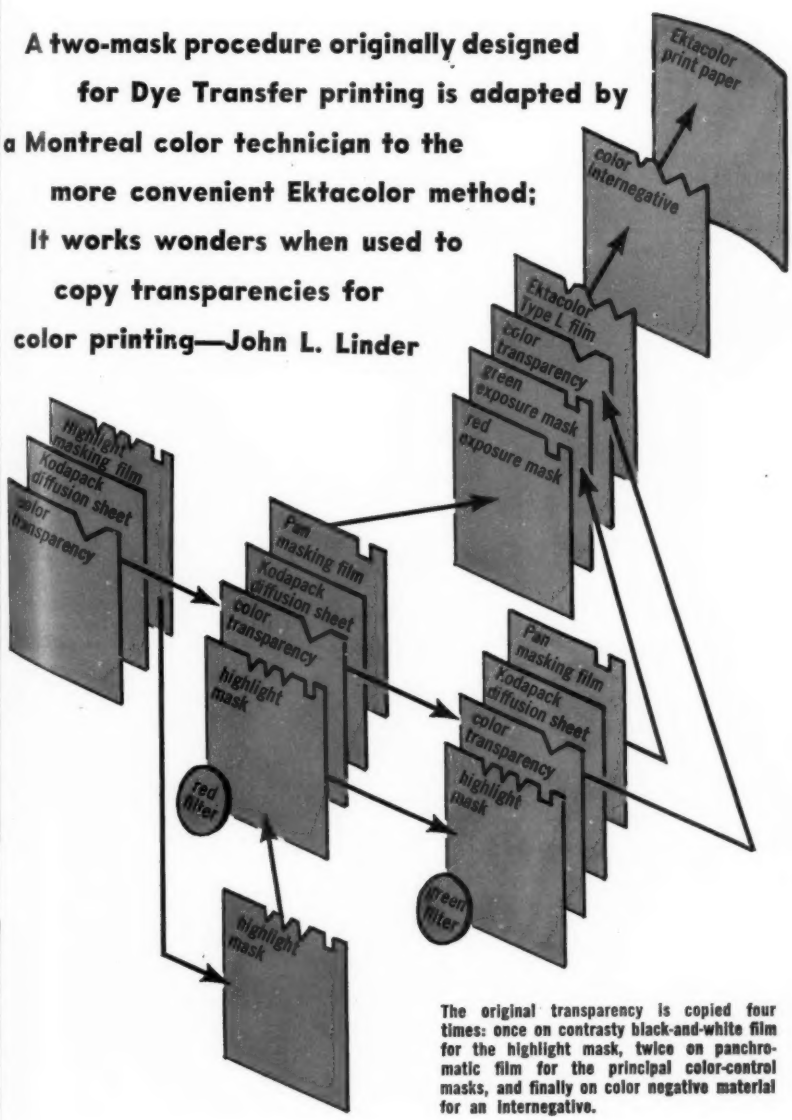
Kodak Register Punch • Kodak Register Printing Frame • Kodak Photographic Step Tablet No. 2 • Kemart Transparent Color Patches • Densichron Model 1 with Transmission Unit • Beseler Enlarger • Kodak Graphic Arts Exposure Computer • Wratten Gelatin Filters as follows: Tricolor Red No. 29 (F) ■ Tricolor Green No. 61 (N) ■ Yellow No. 12 ■ Blue No. 98 ■ CC 10 Cyan ■ CC No. 2b

MATERIALS NEEDED IN THE TWO-MASK PROCEDURE

Kodak Highlight Masking Film • Kodak Highlight Masking Film Developer • Kodak Pan Masking Film • Kodak DK-50 Developer • Kodapak Diffusion Sheet • Kodak Ektacolor Type "L" Film • Kodak C 22 Developing Kit

PRINTS

A two-mask procedure originally designed for Dye Transfer printing is adapted by a Montreal color technician to the more convenient Ektacolor method; It works wonders when used to copy transparencies for color printing—John L. Linder



The original transparency is copied four times: once on contrasty black-and-white film for the highlight mask, twice on panchromatic film for the principal color-control masks, and finally on color negative material for an internegative.

contrast control in common use—such as reduced development of the internegative, flashing, or exposure to short duration speedlight—are of little use by themselves. Even the combination of one or other of these palliatives, coupled with a highlight mask and one principal mask, is insufficient to effect the needed control of both hue shift and contrast.

According to most authorities, good quality second generation color prints can only be made consistently by the use of two principal masks, one made through a red filter and the other through a green one; and where necessary, by the addition of a highlight mask. Again Kodak is specific, this time on page 14 of its revised pamphlet No. 64, *Color Separation and Masking.*

"Regardless of the color used to expose it, a single mask used in exposing all three color separation negatives can accomplish no hue shift correction. With two masks, however, it is possible to correct not only the relative brightness and saturation errors, but also the most serious hue shift errors."

The quotation above relates to the making of separation negatives for the dye transfer process. It holds good, however, for internegative work with integral tri-pack emulsions such as Ektacolor and Kodacolor. What has prevented the widespread use of two mask procedures has been the natural reluctance of photographers to work a process that depends on making two successive exposures onto a single sheet of color negative material in complete darkness.

Andre Duchemin, color techni-

cian in charge of the color laboratory at Rapid, Grip and Batten's Montreal studio, has been working with such a technique for over a year. He estimates that it takes him less than four hours to produce a color internegative with this method, because he has standardized every step. He admits to several months of experimental work before he had it cold. But it has now become just one more of the many routines in his very efficient color lab. Here, step by step, are his recommendations.

To provide a useful degree of both hue shift and contrast control, two masks must be used. In addition, where highlight detail in the transparency is an important consideration, a highlight mask is also needed. As is customary with procedures involving the use of highlight masks, this mask is only used in the production of the principal masks, after which it is discarded. Also in common with other masking procedures, some form of registration of the masks and separation negatives is required. In this case, because the separation negatives are all formed within the same piece of film—the internegative—registration must be automatic. With this in mind, Andre adopted and used the Eastman pin register system. Contact printing procedures have been followed throughout to keep register problems down to a minimum.

Preparing the transparency

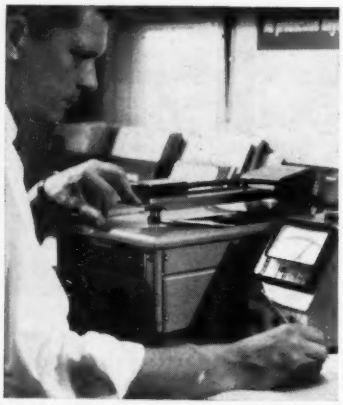
Since the Kodak register punch and printing frames have their pins spaced for the 10-in. dimension of an 8 x 10 sheet, the first thing to do is to mount the transparency to a strip of old film about 1 x 10 in. long. Scotch tape makes a good hinge. Several transparencies can be treated at the same time, providing that their characteristics are reasonably similar. As you will see from the illustrations, Andre shot "two-up" for this article.

In addition to the transparency a step tablet (grey scale), with numbered steps, should be included. As a convenience, you can add a patch of each of the three primary filters. Andre used Kenart transparent color patches for this. This patchwork should look something like the one on the illuminator in the picture *(below, left)*.

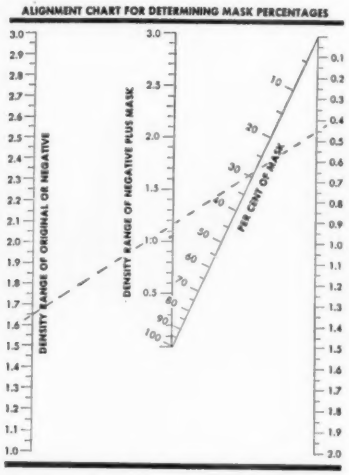
While the transparency is still on the illuminator, you can determine some of its characteristics. If the highlight detail is important, you will want to make a highlight mask.

BASIC TOOLS: A DENSITOMETER, NOMOGRAPH AND GREY SCALE

First step is fastening two transparencies to grey scale, strip for register punch



Densitometer is used in conjunction with charts to determine mask exposures


ALIGNMENT CHART FOR DETERMINING MASK PERCENTAGES
DENSITY RANGE OF ORIGINAL OR NEGATIVE
DENSITY RANGE OF NEGATIVE PLUS MASK
PER CENT OF MASK

This alignment chart, reproduced by permission from the Kodak Graphic Arts Data Book, Masking Color Transparencies for Photomechanical Reproduction, is used to determine the density range of the principal masks. The dotted line represents the example worked out in the article. To use the chart, a straight line is placed across the chart connecting the density range of the transparency with the per cent of mask required. The density range of the mask is then read in the last scale on the right. This information is then translated into exposure and processing time for the masks as described in the article.

UNSHARP MASK: TIGHT CHECK

Beseler enlarger and Kodak Register Print frame are the tools for all mask exposures

Highlight mask will hold back color masks to prevent dimming transparency highlights

If the subject matter is unusually contrasty, you may decide to reduce the development time of the internegative up to 25 per cent; or you may decide on a contrast reducing mask after the internegative is made. It is at this stage that you decide on your masking procedure. If both reds and blues are important to the result, you will have to use two principal masks. In the examples used for this article Andre elected to use a highlight mask and two principal masks.

Reading the transparency

Very little in the way of accurate masking can be done without a densitometer. A Densichron Model I with a transmission unit was used for all the work done for this series.

As a first step Andre measures the density range (D. R.) of the transparency. This is the figure obtained when the highlight reading is subtracted from the shadow reading.

To do this he starts by reading the highlight. Not a "burn" highlight, but one in which he wants to preserve detail. In the case of the potter picture, he measured the side of the head where the backlight hit the grey hair. The reading was .35, which is quite typical for a normal transparency such as this.

Next he reads the shadow. Again he is selective. He does not read a "black," but rather the deepest shadow in which he wants to preserve detail. In this picture he read the lightest area of the potter's black tuque a so-called "open" shadow. This reading was also typical at 2.00.

To preserve uniformity of reading in later stages, Andre then selected the two steps on the step tablet that corresponded to his highlight and shadow readings. Step 2 read .35 and was designated the highlight step, and step 13 became the shadow step at 2.00. All future readings on the masks will be made from these two steps on the step tablet.

The density range is then computed like this:

SHADOW STEP	2.00
HIGHLIGHT STEP	.35
D. R.	1.65

A standard light source

All the recommendations relating to the exposing of the masks and the internegative in this article are based on a standard set-up. Andre uses a Beseler enlarger with the enlarger head at the top of the column. It is fitted with a No. 212 enlarging bulb and a 135mm

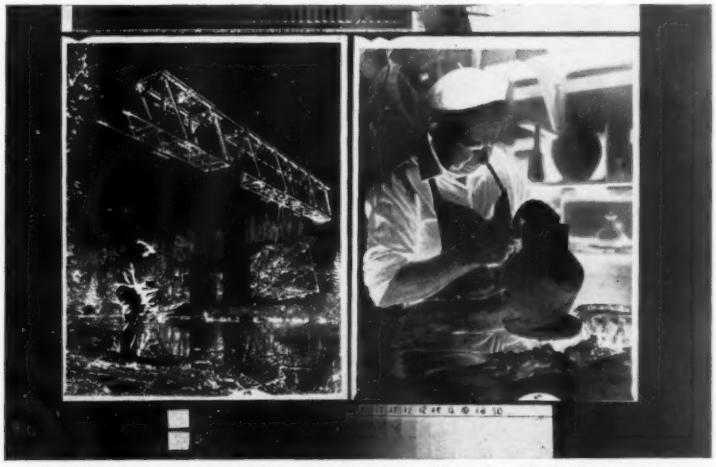
(continued on page 66)

REIN ON COLOR VARIABLES

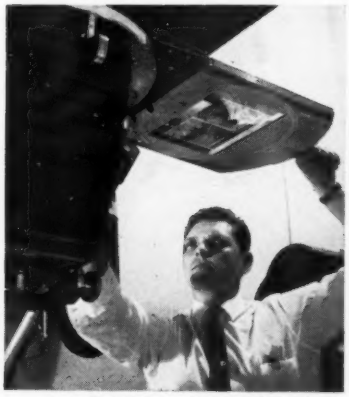
Red exposure mask increases the relative density of reds: e.g., a red shirt

Green exposure mask does same for the corresponding green areas; both cut contrast

CORRECTED INTERNEGATIVE LEADS TO QUALITY COLOR PRINTS



Penultimate: a contact, color corrected internegative of original transparencies



8 x 10 Saltzman is used for enlarging two-up internegatives for color prints

Too long a stepchild, photography assumes its rightful place in Nassau County's Police Department as a deadly weapon against crime. This well-equipped unit handles every phase, including color, with skilled efficiency, helping police this mushrooming New York suburb

Deputy Chief Inspector Thornton (seated) with Lt. Lynch

In police photographic circles, the Identification Bureau of the Nassau County Police Department enjoys a status similar to that of the boy whose father owns the neighborhood candy store. In an area of police activity marked by scarcity, the relative affluence of the Nassau County unit is a goal toward which many other departments aim. Not only does this unit, which supplies photographic service in this booming New York suburb, have ample modern equipment, clean and spacious headquarters, an adequate budget and fairly appreciative commanders, but it has color.

Color photography is not new but the added expense has kept the relationship between this medium and the boys in blue down to a barely nodding acquaintance. Any flirtation was stopped dead by the inexorable power of a tight budget. When a department can just about manage to pay its men a subsistence salary, experiments in color are not advisable. There is also the problem of increased skill and experience needed to handle this photographic prima donna whose temperamental ways make even the best cameramen blanch. Finally, there is the question as to the admissibility of color photography in evidence. This is decided by the individual courts with the barriers breaking down rapidly.

Although these problems are the present and future of many police units, to the 18 men of the Identification Bureau, this is largely in their past. For over ten years, color photography has been a regular part of photographic service, adopted after four years of experimentation, for the Department's identification file or "Rogue's Gallery."

Although the Department was one of the pioneers in color, it is only about 25 per cent of the total work load. In addition to identification photos which are all in color, the men handle virtually every type of photographic assignment from crime scene and fingerprint work to public relations work and personnel identification. In 1959, almost 2000 prisoners were photographed and the Department supplied over 10,000 prints. Evidential work and crime scenes added almost 4,700 to the total while 5,300 prints were furnished to other law enforcement agencies including the FBI and the New York City police. The photographic file includes al-

most 30,000 pictures of prisoners and over 80,000 photos of other subjects. In short, although the extensive use of color has created a national reputation for this unit, they are a well-rounded section using photography in law enforcement.

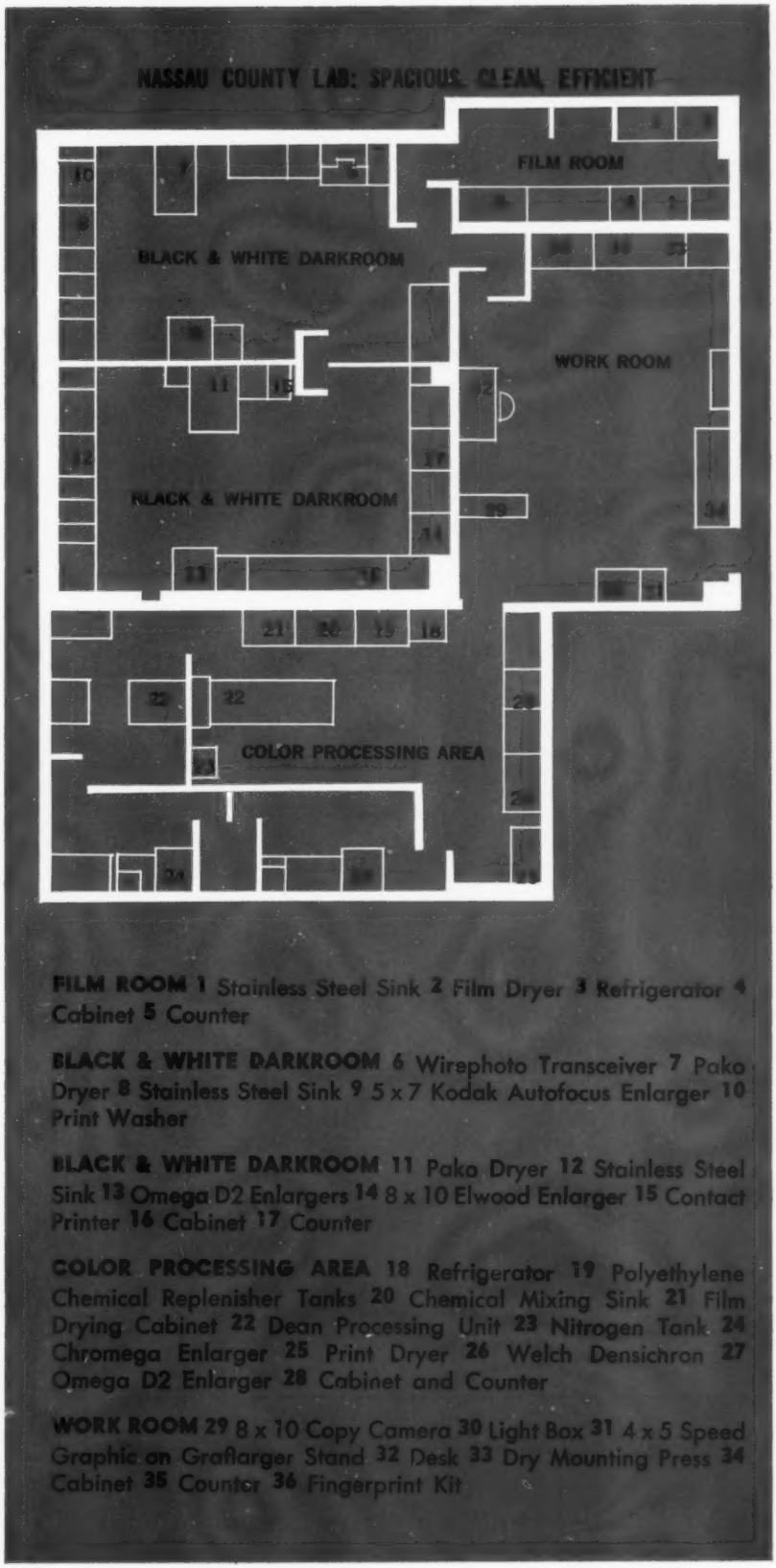
These men are not primarily photographers although many have had photographic background, either amateur, professional or in military service, before joining the Department. Rather, they are trained police officers, in both photography and identification, using both to perform their assignment.

Commanding Officer of the unit is Deputy Chief Inspector Vincent Thornton. A veteran officer with over 22 years on the force, he is responsible for the functioning of the Identification Bureau. Two Lieutenants, Edward Lynch and Harry Kaplun, are assigned to the Bureau. Lynch, who is senior, assumes command in the absence of Chief Thornton. Three sergeants and 12 detectives complete the roster. Men assigned to the Bureau must have at least five years service as Patrolmen and are carefully screened before being accepted. Upon assignment to the Bureau, they are promoted to the grade of Detective with a salary range of $6,200 to $6,850 annually.

Although previous knowledge of photography is helpful, the men are trained within the unit, working with experienced officers until they attain the high level of competence required. Chief Thornton estimates that it takes about two years to completely train a new man so that he can handle any possible assignment. However, due to the high degree of skill needed, color printing is handled largely by three men, Sergeants William Golden and Walter Heitner and Detective Karl Koch.

Chief Thornton, under whose command the move to color was made, estimates that since the Department switched to color for prisoner identification, positive identifications (by witnesses, which would stand up in court) have increased 50 per cent over those made from black-and-white photographs. Actually, the Rogue's Gallery represents quite a departure from the traditional full-face and profile "mug" shot.

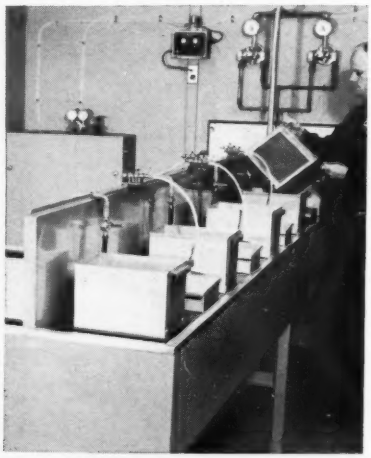
All photographs, in addition to being in color, are full figure front and side. In addition, Chief Thorn-


NASSAU COUNTY LAB: SPACIOUS, CLEAN, EFFICIENT
FILM ROOM
BLACK & WHITE DARKROOM
WORK ROOM
BLACK & WHITE DARKROOM
COLOR PROCESSING AREA
FILM ROOM 1 Stainless Steel Sink 2 Film Dryer 3 Refrigerator 4 Cabinet 5 Counter
BLACK & WHITE DARKROOM 6 Wirephoto Transceiver 7 Pako Dryer 8 Stainless Steel Sink 9 5 x 7 Kodak Autofocus Enlarger 10 Print Washer
BLACK & WHITE DARKROOM 11 Pako Dryer 12 Stainless Steel Sink 13 Omega D2 Enlargers 14 8 x 10 Elwood Enlarger 15 Contact Printer 16 Cabinet 17 Counter
COLOR PROCESSING AREA 18 Refrigerator 19 Polyethylene Chemical Replenisher Tanks 20 Chemical Mixing Sink 21 Film Drying Cabinet 22 Dean Processing Unit 23 Nitrogen Tank 24 Chromega Enlarger 25 Print Dryer 26 Welch Densichron 27 Omega D2 Enlarger 28 Cabinet and Counter
WORK ROOM 29 8 x 10 Copy Camera 30 Light Box 31 4 x 5 Speed Graphic on Graflarger Stand 32 Desk 33 Dry Mounting Press 34 Cabinet 35 Counter 36 Fingerprint Kit

COLOR IN ONE OF THE COUNTRY'S BEST-EQUIPPED POLICE LABS

Identification photos are full-figure shots made in color for greater accuracy. System has boosted identification 50% over old "mug" shots

Koch adjusts Chromega enlarger before making Ektacolor print



Sgt. Golden at the light section of unit's Dean color processor

Detective Koch, a color specialist, draws replenisher from storage tank

Sergeant Golden checks inventory of color material with Det. Koch

NASSAU POLICE *(continued)*

ton has revised the filing system from the old modus operandi file, according to type of crime, to a personal characteristic system. In this system, prisoners are filed according to sex, color, height, approximate age, etc. Thus, while a prisoner may commit several different crimes, physical appearance remains constant and he can be more easily identified. Color photography is, of course, basic to this system.

Prisoner photographs are made on a 4 x 5 Graphic View which has been fitted with a Graflok sliding back. Two shots, approximately 4 x 2¼ in. are made on one sheet of Ektacolor sheet film. Lighting is supplied by six Kodatron units working from three power packs. The lamps are arranged to minimize shadow so that nothing can distract from the subject. Basic exposure is f/6.3 through an 85 filter. The camera and lights are fixed so that all the officer has to do is place the subject at the height bar and make his picture. He need not focus or move the camera. A grey patch, of 18 per cent reflectance, is mounted on the bar as an aid in matching color density.

A duplicate set of pictures is made on Super Panchro Press, Type B, for quick processing and for sending prints to other police agencies in a hurry. Basic exposure on black-and-white is f/32.

The road to success in color work in particular (and in photography in general) might be compared to a railway track, one rail of which is standardization and the other rail, control. Both conditions are maintained by the unit. The first step in standardization was the maintenance of constant lighting and camera position. The first step in control takes place in the basement of the modern police headquarters. It is there that the complex (and expensive) filtering system processes the water from the county water supply to a physically and chemically pure fluid for the photo lab.

The first step is the addition of alum and potash to the water to change its ph from the original, acidic 5.8 to a neutral 7. From there, the water is passed through seven tons of coal of varying size to filter out any particles of dirt. The filter system is back-flushed every 30 days to remove accumulated

sludge from the filters. Finally, the water is heated for use in the photographic darkrooms.

In the lab, Powers valves provide further control of the water temperature, keeping all solutions at the required 70 degrees.

The line voltage going into the color print room is also controlled, by a Solar voltage regulator. This unit keeps the voltage going into the Chromega enlarger at a constant 120 volts.

All color subjects are photographed on Ektacolor sheet film which was adopted as standard by the Bureau about six months ago. Before this, Ektachrome was used. At the same time as the new film was adopted, the unit changed its print material from Printon to Ektacolor (formerly Type C) paper.

Materials for the lab are purchased in quantity on a quarterly basis. The brands and types of materials are specified by Chief Thornton and sent to the Department of Purchase where bids are invited from suppliers. The low bid gets the contract. Paper, for example, is purchased in 750 to 1000 sheet lots for Ektacolor, about 5,000 sheet lots for black-and-white.

A master print is made for every batch of color paper so that the basic filter pack for that emulsion number can be determined. Color negatives, printed in a Chromega D-2 enlarger, are read with a Model 2 Densichron to determine exposure and color balance. A comparison of the negative to be printed with the master gives correct exposure and filtering. As a result of such control, with rare exceptions, an acceptable print is secured on the first try. Chief Thornton considers the Chromega and the Densichron "the two basic tools for any lab wishing to handle color on a reasonably efficient basis and still maintain quality with high production."

Behind the quality of the color print, of course, is the color negative. In this phase, manufacturer's recommendations are followed precisely. Temperature of the water bath and the processing solutions is maintained by Powers valves for each of the two Dean units in the color film lab. The film, all 4 x 5 sheets, is processed in 3½-gal. tanks in holders. A Lektra gas burst timer provides nitrogen-burst agitation at 15-sec. intervals.

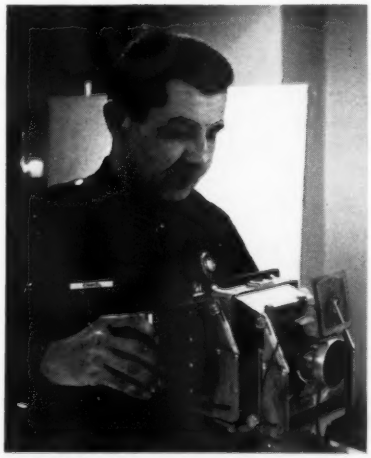
(continued on page 70)

ABOUT 75% OF THE WORK IS HANDLED ON BLACK AND WHITE

Printing room, one of two, is carefully planned, well-equipped for high quality work with a minimum of wasted time or photographic material

Detective Coli checks film holders in one of Bureau's two photo trucks

Sgt. Hibbard photographs evidence using light box, Speed Graphic



Det. Chmiel at view camera. Filter for color film is mounted over lens

Lieut. Kaplun photographs fingerprint using 8 x 10 copy camera

THE PHYSICS OF EVERYDAY COLOR

We may make a good start on the subject by considering the illumination of shadows and the quality of light reaching the eye from such areas. If a single-point source illuminates an object, there is behind this object a region of space into which this light cannot penetrate directly. The illumination in this shadow region, therefore, must come from elsewhere. There are only two possibilities, but their implications are tremendous. The illumination in this shadow *must* come either from another primary source or from a secondary source such as an object reflecting the light. In either case there may be litle resemblance between the quality of the light reaching the object directly and that reaching the shadows; perhaps it should be pointed out that, if *no* light reached the shadow areas, details in these areas would be invisible to the eye.

In a similar manner, if there are two small light sources, both forming shadows from the same object, there will, in general, be a portion of each shadow illuminated by the other light and an overlapping region illuminated by neither. When such a pair of lights is present the situation is fairly obvious. Unless the lights are quite different in intensity the double shadows are evident, as well as any differences which may exist in their colors.

A more common and far less apparent situation arises when there is one small source and one large source. In this event the small source forms shadow but the large one may not, with the result that the shadow area may be lighted entirely by the large source. Such a situation exists in daylight, where the sun and the sky are the two sources, and in interior illumination, where reflected light from the walls or a deliberately lighted ceiling may form the second source. In these instances the shadow illumination may vary from practically zero to an intensity value just less than that from the combination of the two; the limit is reached when the light from the small source is so weak in relation to the larger one that no visible shadow is produced. From the standpoint of the physics of color the estimation of the quality of such shadow illumination is often a difficult problem. It must be remembered that, if an object is sending enough light to the eye by reflection so that the object is visible, it is sending the same amount of light in many other directions also. If it is situated near the shadow of another object, it sends this light into that shadow unless there is some obstruction. Accordingly, if there is a single source, all the shadow illumination comes from reflecting objects near by; and if these have selective surfaces, this light will, in general, be colored. When there are several objects of different colors, the shadow illumination is the additive mixture of all of them. It seems well to review in some detail the physics of a few common examples.

Daylight

Perhaps the most common situation in which we deal with double or multiple light sources is daylight itself. When the sun is shining there are always at least two light sources to be considered: the sun and the sky. The intensity of the direct sun on a clear day at noon does not vary greatly throughout the year when it is measured on a surface perpendicular to the sun's rays. Although the expression "clear day" is a little vague, it is usually correct to assume that if distance visibility is good and the sky is deep blue, the intensity of the sun is about the same the year round (8,000 to 11,000 foot-candles). However, if instead of on a surface perpendicular to the light the intensity is measured on a surface parallel to the ground, the variation is much larger and in the northern parts of the United States amounts to more than a ratio of 3 to 1. If the day is not clear, the direct sunlight may easily drop to one-fifth; similar and lower values may be found before sunset even on clear days. Sunlight, therefore, is not a constant intensity source; its variations are of the order of magnitude of 5 to 1. The light from the sky, however, depends on more factors than its brightness alone. The sky itself is a hemisphere of more or less constant brightness with a deep blue color on a clear day with no clouds. If an object has a shadow behind it cast by the sun under these conditions, the shadow is illuminated by the sky and has an illumination intensity of about one-fourth that of the sun on the object. The color of this light, of course, is just as blue compared to the sun as the sky appears directly to the eye. In fact, a shadow on a white surface will be found to match the sky if some way, such as with two mirrors

Color is neither physics nor psychology; it is *both*. Physics cannot predict the appearance of a given energy distribution nor can psychology predict the color of a subtractive mixture. Both together *should* be able to do both; this and similar aims should be the goal of the science of color. Rather than attempt an academic summary of the facts we shall consider color as it is encountered in everyday life. Much of the so-called mystery of color comes from the fact that people do not look at color critically. We tend merely to assume that colors are what we think they are and do not verify our assumptions. It is hoped that what follows may lead some people to look carefully at colors—by Ralph M. Evans

or the like, can be found to make a direct comparison.

If the sky contains isolated clouds there are two effects produced. In the first place part of the sky is covered by the clouds, and in the second these clouds, if they reflect the sun, mix sunlight with the blue. Under these conditions the intensity of the light in the shadows may become much higher than before, and the color far less blue. In the extreme case of large numbers of scattered clouds lighted by the sun the light intensity may be quite high in the shadows and the *same* color as the sun. If there is a haze between the sun and the object, this haze will tend to decrease the intensity of the direct sun and increase that of the shadow until a point is reached where the sun is completely obscured and the shadow disappears. We then have what is known as an "overcast sky" in which the sun is not visible. The intensity of the light on such days may vary from a relatively high value (perhaps 3,000 to 4,000 footcandles) to the very low values for daylight (as low as 100). The color of the light on an overcast day also can vary widely, depending on the conditions existing in the sky. If direct sunlight is obscured by heavy clouds and the rest of the sky is obscured with light mist, the light can be quite blue, nearly as blue as the sky itself. The condition prevails regularly early and late in the day when the sun is low in the sky. If the overcast consists of a low-altitude haze which is heavy enough to obscure the sun, the light may consist of a mixture of sunlight and skylight and be the same color as the sun outside the earth's atmosphere. At sunrise or sunset the usual sunset colors may be diffused by the overcast, and the whole illumination color may move quite far toward pink.

It is seen, therefore, that not only for the light falling directly on an object, but to an even greater extent for the light illuminating the shadows, daylight itself varies over rather wide extremes. So far we have considered only conditions in which light from the sky is not obstructed by other objects and in which no other objects are reflecting light into the shadows. Under other conditions daylight becomes even more complex. The illumination in shadows may reach exceedingly low values, as, for example, in a forest where sunlight comes through small openings in the foliage. Under these circumstances, any light that reaches the shadows at all comes from objects reflecting the sunlight, and this light will, in general, be the same color as that of the objects. If some skylight and some reflected sunlight reach the shadow, the color of the light will be the additive mixture of the two.

Both the color and the intensity of the illumination in a shadow, therefore, may vary greatly, direct sunlight being the limiting intensity. In general, out in the open the shadows will tend to be blue, but blue will not be the predominant color if there are highly reflecting colored surfaces such as brick buildings or trees near by or if the day is not clear. Of the two variables, color and intensity, the intensity factor is by far the more noticeable. The ratio of direct sunlight plus skylight on the object and skylight plus reflected light in the shadow can vary all the way from 1 to 1 on an overcast day when no shadows are thrown, to exceedingly high values—so high, in fact, that no detail can be seen in the shadows unless all directly reflected sunlight is shielded from the eyes. Shadow contrast, therefore, is perhaps the largest single variable in daylight. Next in general magnitude come the variations in shadow color, which theoretically can be any color but usually contain a fair amount of blue; and third, the variations in general color of the direct illumination, which can be a mixture of sunlight (varying from white at noon through yellow and orange to red at sunset) with the blue of the sky in all proportions. These last variations mean in the white, the yellow, the orange, the red and the pink ranges, but the color is white usually, most of the day.

Surface reflection

In addition to these color and intensity changes, the geometrical nature of daylight illumination can vary over an immense range. Direct sunlight coming in a window is essentially parallel light (extreme angle ½°). As such, when it falls on a selective object with a smooth surface, it gives rise to about the maximum selective reflection of which the object is capable. At the other extreme, if such an object is placed in the open on an overcast day, there will be no position in which it can be seen that does not give direct reflection of the sky from the smooth surface. The light

"The Physics of Everyday Color" is Chapter 6 of An Introduction to Color, by R. M. Evans, New York, John Wiley & Sons, Inc., 1948. It is reprinted with the permission of the publisher. Mr. Evans is director of the Color Technology Division of the Eastman Kodak Company.

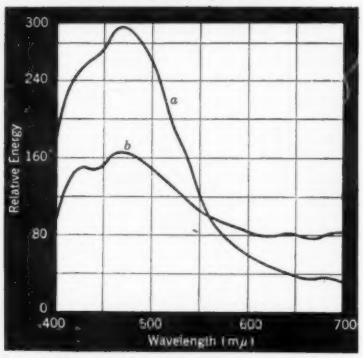


Fig. 1 Energy distribution curves of light reflected from a blue object with a glossy surface when it is illuminated (a) by direct sunlight and (b) by a uniformly overcast sky.

from the object under these conditions mixes additively with the maximum amount of skylight, and the object shows *minimum* selectivity. The possible magnitude of the effect can be judged from the two calculated curves of Fig. 1. Between these extremes come all possible combinations of the two, such as sunlighted clouds, haze, and clear blue sky. It is not worth while to consider all of them separately, but two facts should be considered carefully. Most objects in nature have a surface which is more or less smooth, and the reflectance of such a surface increases rapidly as the angle at which it is viewed decreases. Any object, such as a leaf in sunlight, therefore, may have a fairly intense selective action if it is viewed perpendicular to the surface in direct sunlight. Viewed in the light from an overcast sky it may show very little selective action because of the high brightness of the reflected source. Viewed across the surface at a glancing angle it may well show *no* selective action at all but may simply reflect the light from whatever is in the proper position. If the light is from red brick, the reflected light will be red; if it is the blue sky which is reflected, it will be blue, etc., without regard to the color of the leaf. The faces of people show this effect quite clearly, even when considerable face powder has been used.

The term "daylight" is obviously to be interpreted as meaning "not-artificial light" rather than as a description of the actual effective light at any given time or place. Determination of the actual quality of light outdoors at any particular spot calls for careful study of all the conditions involved.

Interior illumination

Perhaps to an even greater extent these considerations hold true inside buildings whether the light is natural from outside the building or artificial from inside. Under these conditions the direct light falling on an object, i.e., the light which *causes* a shadow, may be of almost any quality, and the light in the shadow may be the same or very different. A room having one large window beside a large tree with green leaves in full sunlight is lighted entirely, for all practical purposes by green light. The energy-distribution curve for such light may be almost wholly that given by sunlight on green leaves (Fig. 2). On the other hand, if sunlight enters the window and falls on a bright red carpet, all other objects in the room are lighted by *red* light of the color of the carpet. For the room, the green tree or the red carpet are the *primary* sources of light. It does not matter that the light arises by way of a reflecting source. The point is that all the light illuminating other objects has this source quality, and the tree or the rug may be considered as if it were giving off light. This is a general fact which is encountered in many important situations, and it may be summarized in a general rule. The quality of the light reaching an object is that of the sum of the light qualities reaching it from *all* the points of its environment, and each of these points may be considered as an independent source.

With this is mind it is important to consider somewhat more closely the factors that affect the quality of such reflected light. In particular, it is important to consider the various qualities of light present in a fairly small room lighted by a single source, such as a fairly bright lamp

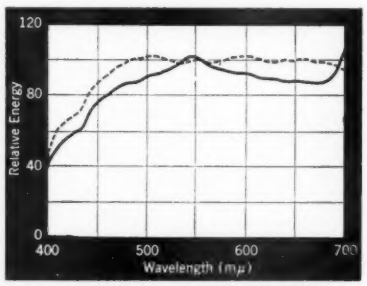


Fig. 2 Curve (solid) representing sunlight reflected from a typical green leaf. Light includes both diffuse and specular component. The broken curve is for sunlight alone and is included for purposes of comparison.

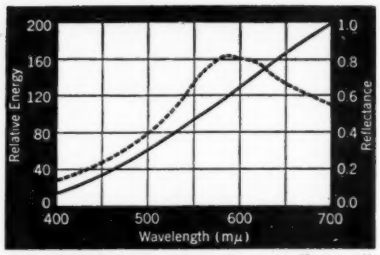


Fig. 3 Reflectance curve for a yellow wall (broken curve) and spectral distribution of an incandescent lamp (solid curve).

with a shade open at the top so that considerable light falls on the wall and ceiling above as well as directly on objects not obscured by the shade. It is not necessary to consider the direct light carefully; its intensity decreases with distance from the lamp according to the inverse square law and may become negligible at a relatively short distance. The light which falls on the ceiling may cover a fairly large area, and if the ceiling is white and diffusing it will reflect light of the color of the source to all corners of the room. Since it acts as a large source, its intensity will decrease with distance very much more slowly than indicated by the inverse square law; in fact, it may not decrease very much over the whole length of the room. The same is true of the light falling on the wall, with the important exception that the quality of light reflected will depend on the selective action of the wall itself. Suppose, for example, that the wall is a fairly deep yellow, perhaps with the reflection curve shown in Fig. 3, in which the energy distribution of the source has been included. Light falling on an object in the middle of the room, therefore, will consist largely of light from the wall and the ceiling and not from the lamp directly; this light will be distinctly yellow compared to that of the source itself. Several complications may arise from this apparently simple conclusion, however, and these must be considered separately. The first of them is the possibility of another selectively reflecting surface near the object. The second is the multiple reflection of light back and forth between the walls of the room. Both effects are identical in principle but may be somewhat different in the nature of their results.

If a large reflecting surface stands just behind the object and is selective in its action, it will throw

light into the shadows behind the object. If the surface is red, for example, the shadow light will be that of the yellow illumination from the walls and the ceiling as modified by reflection from the red surface.

In the absence of a large surface lighting the shadow, the light which reaches this point must come by reflection from other points in the room. The largest areas are usually the ceiling and the walls. Light falling on one wall reflects into the room, strikes another wall, reflects again to a third, etc. Even if the walls are fairly light colored, the net results is a very considerable deepening of the color due to this multiple reflection. The curves in Fig. 4 show the quality of artifical light as reflected from a cream-colored wall (broken curve) and the quality of the light after the first, third, fifth, and tenth multiple reflection. It is apparent that a great increase in selective action has taken place. The light reaching any object in such a room is the sum of all these reflections, after their relative intensities have been taken into account. This effect enters as an important factor into the visual color of any shadows which may be present in the room. It also is a determining factor in the apparent color of the walls themselves. The common experience of finding that the color of a paint or wall paper has become far more intense *after* it has been placed on a wall than it appeared in a small sample is due largely to this effect.

In passing it may be noted that many objects owe a peculiar type of beauty to this effect. When the interior of any object such as a bowl or box is colored, multiple reflection will very greatly deepen this color, and its appearance will change greatly, depending on the angle at which light enters the opening.

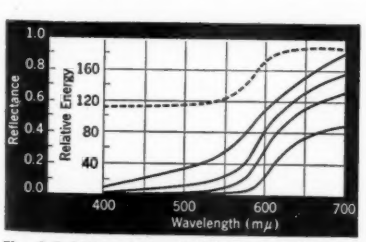


Fig. 4 Relative energy distributions of the first, third, fifth, and tenth multiple reflections of light from an incandescent lamp on a cream-colored surface. The solid curves from top to bottom show how the light reflected from the surface becomes darker and redder as the number of reflections is increased. The broken curve is the reflectance curve for the surface.

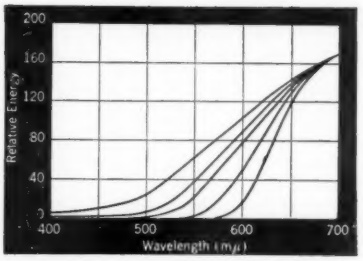


Fig. 5 Relative energy distributions of the first, third, fifth, eleventh, and nineteenth multiple reflections of light from an incandescent lamp on a gold mirror. The top curve represents the light quality after the first reflection, and the bottom curve after the nineteenth. All curves have been plotted to the same maxima.

This effect is particularly noticeable in objects such as silver goblets which have been lined with gold. Gold has a distinct selective surface reflection as well as a high reflection factor. If the walls of the objects slope slightly, it is possible to get multiple reflections of a high order. The result is a deepening of the color of the gold, sometimes to a deep red. Curves for the first, third, fifth, eleventh, and nineteenth reflections of gold are shown in Figure 5.

The illumination in a room, therefore, cannot be specified by describing the lamp bulb or by the statement that it is daylight coming through a window. The light on each separate object and the light in its shadow call for separate consideration. Careful study will often reveal that the light is far different from what might have been expected. Consider, for example, the complexity of the common situation in which daylight enters a window in a room in which artificial light is being used to illuminate dark corners.

The reader may find the foregoing statements at variance with the facts of his everyday experience. They have been introduced deliberately to call attention to the fact that such a discrepancy exists. None of the statements is exaggerated, although, of course, in any given situation some of the factors may not be present. Actually in a poorly illuminated room it is almost impossible to calculate the quality of the light at any particular spot; it may vary over exceedingly wide limits. Ordinarily *none* of these differences is more than casually noticed by an observer. Consideration of the reasons for the last statement must be postponed since they come under the headings of psychophysics and psychology, but the facts brought forward should make one at least hesitant about any academic statements concerning the color of shadows under such conditions. It may be that shadows when lighted by *white* light follow definite rules, but it does not follow that all shadows are so lighted. It is the *appearance* of such things which counts most either in painting or in daily life. The actual energy distribution is important only when the *effect* of this light is to be calculated or otherwise used.

Atmospheric diffusion

The appearance of objects out of doors suggests also the next subject which must be considered in this survey. The primary and secondary light sources so far considered have had definite locations and sizes. There is, however, an important group of secondary sources that do not. They may in fact be considered as volume sources. These are the instances so often met in nature of diffusion of the light by particles in the air, known by various names such as haze, mist, fog, and snow.

When the air is filled with particles of moisture, these particles deflect the light, either by the scattering considered earlier or by direct reflection. Their presence in the air also changes it from a clear transparent medium to one which, if it were a liquid, would be described as cloudy or turbid, sometimes even practically opaque. Because of the frequent occurrence of such conditions it is worth while to consider them systematically, if only briefly.

The air is considered to contain haze when a distant view has superimposed on it light which appears to originate in the air between the observer and the distant objects. The color of this light is normally somewhat bluish and owes its presence to sun or skylight scattered by moisture or dust particles in the air. The amount of light scattered by a given volume of air is the same at all places in the view, but the amount seen by the observer depends on the total distance *through* the air to the distant point at which he happens to be looking. Accordingly, the amount of bluish light *added* to the light from a distant object will depend on the distance to that object. If the object is far enough away and sufficiently dark, it may be completely obscured by this added light and so appear blue.

At lesser distances and for lighter objects the added blue will play a lesser role, and for near-by objects it will not be apparent at all. The distance of objects, therefore, may be judged by the extent to which they appear blue; this effect is so common that among artists it has received the name of "atmospheric perspective." Producing this effect is a standard technique for the indication of objects at a distance in paintings.

Aerial haze has another equally important characteristic which is frequently overlooked. Since it owes its bluish color to the fact that it scatters short wavelength light *out* of a beam of light, the light which it transmits directly is deficient in these wavelength regions. Accordingly, light-colored objects in the middle distance will send less short wavelength light to the eye than if the air were clear and so will tend to appear of a browner or redder color. At a greater distance this effect may be offset by the scattered light from the sun, and at less distance there may be no effect. When haze is present, pale yellow surfaces at different distances, for example, may be yellow near by, orange to reddish brown in the middle distance, and blue at great distances.

When the moisture particles become larger there may be a condition that we call mist. Such a condition differs from haze because the particles are too large to show selective scattering and objects are seen covered with more and more white light as the distance increases. Near by there may be deep blacks and pure colors, but as distance increases more and more white light reaches the eye along the path until all objects are obscured by a uniform blanket of light. Under these conditions, colors do not change except as they fade into white.

More similar to haze but not ordinarily bluish in color is the exceedingly heavy haze which we call fog. In this circumstance, the number of moisture particles in the air is so high that the observer may not be able to see objects at all, even at relatively short distances, and he feels himself completely immersed in the light source itself. It is only when some other light source bright enough to penetrate the fog, such as a streetlight at night, can be seen, that the resemblance to haze becomes apparent. Under these conditions, there is a strong shift of the quality of the light toward longer wavelengths and a consequent shift of color toward red.

Snow, on the other hand, acts like mist because white light only is added and there is no selective transmission. White light, sometimes in very large amounts, is added to the light from all objects. In a heavy snowstorm objects at 5 or 10 feet may become completely invisible although the brightness of the light may be quite high. One often receives the impression of opacity as if the snow were too dense to see through, but an equally heavy snowfall at night may appear quite transparent.

Additive mixture in nature

In all these cases of added light it is apparent that the quality of the light reaching the eye depends on the addition of several qualities that are reaching the eye simultaneously. Similar cases were discussed also in the section on surface reflections and occur very generally. In addition to these there is a whole class of additive mixtures quite common both in nature and in daily life which have not yet been mentioned. These are the instances of additive mixture that result when the areas or sources involved are effectively so small and close together that they cannot be separated by the eye. Under these conditions the light may be considered mixed before it reaches the eye, and it therefore acts as if it were a uniform source of the color of the mixture.

In nature this effect occurs often, especially in distant landscapes, and much of the beauty of distant hills arises from the way in which small areas that would be seen as separate colors if near by become fused with other colors to produce a single new color. Sometimes in the fall, especially in the northeastern part of the country, when the leaves have changed color, this process may be seen repeated a number of times in one distant view. At a certain distance the individual leaves will have fused to make one color for each tree. At a greater distance clumps of related trees will fuse to a second color, and far away there will be one color for wooded sections and one for the areas without trees.

This same additive mixing is a common phenomenon in textile materials in which threads of various colors are woven into some sort of pattern. From a short distance the individual threads may be visible, but at a certain distance these become invisible with the pattern still showing. Still further away the pattern disappears. The laws of additive-color mixture are well known and the results of such mixtures can be predicted accurately if the colors of the individual parts are known. Certain reds and blues mix and become purple, for example, and yellow or orange is formed if red and green are mixed. In this respect then, additive mixtures differ from the substractive effects we have been considering: subtractive effects can be predicted only from a knowledge of the energy distributions involved, but additive ones, independent of their energy distributions, depend only on the colors originally present. This fact is a fundamental property of the eye. It must be emphasized again that additive mixture and subtractive effects are fundamentally different phenomena. It does not follow, however, as is often assumed, that *therefore* the *colors formed* by additive mixture are in themselves different from the same colors formed by subtractive effects. The eye responds to the energy distribution of any light which enters it, and its response is independent of the manner in which this quality is produced. When small colored areas are far enough away so that the individual areas cannot be seen, it is impossible to tell whether the color seen is continuous. The color would look exactly the same if all the small areas were replaced with a single large area having the mixture color. There is a condition, however, under which these additive mixtures are very different from a solid area of color, and this occurs at the distance at which the small areas are almost *but not quite* fused. Under these conditions the eye sometimes sees the individual areas and sometimes the fusion colors so that there is an interplay of color which gives it a visual brilliance and sparkle not possessed by a single area. This interplay occurs only *at* the fusion distance and is a purely visual effect having nothing to do with the physics of the situation. Closer viewing shows only the small colored areas. For example, a random series of red and green dots covering a surface will be seen as such if the dots can be resolved by

the eye, and no trace of yellow will be visible. As the distance from the observer increases, there will be a point at which the mixture color comes and goes (usually as a yellowish brown since a bright yellow cannot be produced in this manner) and red, green, and brown are all visible at once. At greater distances the color becomes permanently brown and cannot be seen in any other way. The production of brown rather than yellow in this example is typical of this sort of mixture in general. It is almost always possible to find a single color which, painted over the same area, will be a brighter color than can be formed by additive mixture. Any advantage in brilliance occurs only at the distance at which it is *not quite* fused.

The factors that have been considered thus far have been general in that they apply to all selective surfaces and in that they change the selective action of surfaces. Before we proceed to consider a number of specific examples, it is interesting to consider broadly the implications of what has been covered. It was found that under special circumstances the nature of the illumination in connection with the type of outer surface of the material could cause the selective action to vary from a certain maximum to a completely non-selective action. It was found that this outer surface always plays a large part in the color. Since this surface depends also on circumstances it can change materially over a period of time. Dirt and dust will dull a smooth surface and add white light to the color of the object regardless of the type of illumination as many a housekeeper has learned from experience. On the other hand, rain may wet the outer surface of a leaf and change it from a dull, lifeless thing to a deep, pure green object. The presence of smoke, haze, fog, and the like may add white or blue light to objects at a distance as well as shift their color toward red. Distant viewing of small colored areas may fuse them to an entirely new color. Finally, viewing of surfaces from an intermediate distance may make their appearance fluctuate between the colors of individual areas and the fusion color of the whole. It is apparent that from the physical standpoint there is no such thing as a single quality of light which will describe a given object's action even though we consider it in relation to only one illuminant. It is well to keep these facts in mind. We shall find when we come to consider the psychology of seeing that the naive observer does not see these things and that *no* observer can see some of them without visual aids. When we come to consider the reproduction of scenes it will be found that it is necessary to copy *neither* the appearance (as an isolated area) nor the light quality, but something between the two which can be determined only if we are aware of *both*. In view of this fact, the rest of the chapter will be devoted to a consideration of the physics of certain common colors encountered in life and of the physical properties of some of the media employed by artists. In passing it will be well to consider a few of the other associated factors which properly belong in later chapters.

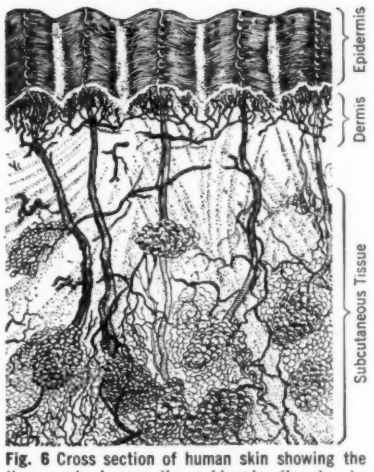


Fig. 6 Cross section of human skin showing the three main layers, the epidermis, the dermis, and the subcutaneous tissue.

Human skin

Perhaps the most important color of all those encountered in nature is that of human skin. It is also one of the most complex. For our detailed knowledge of the physics of color production by flesh, we are largely indebted to the work of E. A. Edwards and S. Q. Duntley (see bibliography) at Massachusetts Institute of Technology. The following facts are taken largely from their papers on the subject.

Human skin is made up of a number of layers into which the light may penetrate. The physical arrangement is illustrated in the sectional diagram of Fig. 6. An outer diffusing surface, called the epidermis, has below it a layer of skin in which the light is extensively scattered. Below this is the flesh proper, made up of blood cells and the like. Three selective actions take place as far as light is concerned, and the relative amounts of these three actions determine the color as seen from any given direction under the given lighting conditions. The diagram of Fig. 6 shows only what might be called the average structure. In some parts of the body, notably the lips, the epidermis is largely missing. In others, such as the soles of the feet, the blood cells are not effective. The various combinations of all these factors give rise to a variation in color which spreads over the range yellow, red, white, and blue, not to mention the magenta that can be produced by additive mixture of the scattered light just under the surface and the red from below or artificially produced by cosmetics.

In somewhat more detail the selective actions involved are as follows. There is in almost all human flesh (the exception is the rare albino) a yellow pigment called melanin, the amount of which increases as the skin is tanned by the sun. Associated with melanin, and believed to be a derivative of it, is a second yellow pigment called melanoid. The transmittance curves for melanin and for the stratum corneum of a cadaver's heel are shown in (*a*) and (*b*) respectively of Fig. 7. The cadaver's heel displays the spectrophotometric characteristics of melanoid. These pig-

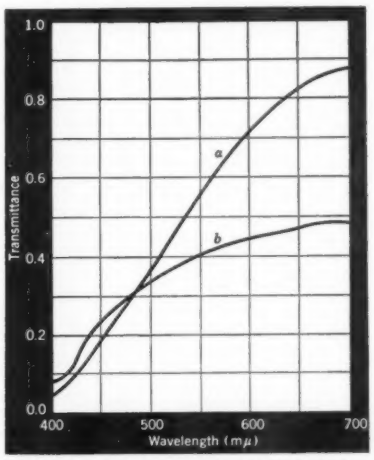


Fig. 7 Transmittance curve for: (a) (melanin in a 5% potassium hydroxide solution and (b) stratum corneum from a cadaver's heel which displays the spectrophotometric characteristics of melanoid. (E. A. Edwards and S. Q. Duntley, **The American Journal of Anatomy**, Vol. 65, pp. 9 and 13, 1939.)

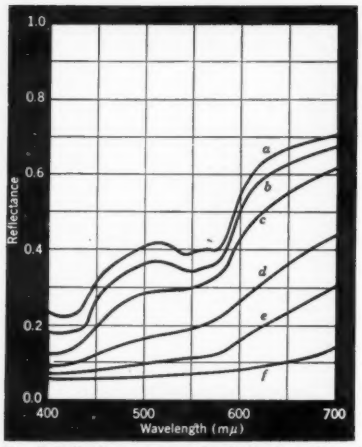


Fig. 8 Reflectance curves for buttock region of different races: (a) white blond, (b) white brunet, (c) Japanese, (d) Hindu, (e) Mulatto, and (f) Negro. (E. A. Edwards and S. Q. Duntley, **The American Journal of Anatomy**, Vol. 65, p. 29, 1939.)

ments are present below the outer surface, and the amounts vary between individuals and races. Figure 8 shows the reflection curves found by Edwards and Duntley for various races. The immediate color changes resulting from sun exposure are primarily due to an increase in blood concentration near the surface of the skin rather than to the production of melanin. Figure 9 shows the result on white skin of prolonged exposure to sunlight.

The absorption due to blood is shown in Fig. 10, the two forms of hemoglobin and oxyhemoglobin are shown corresponding to the colors before and after the blood takes up oxygen from the lungs.

The blue color produced by light scattering has already been discussed when consideration was given to the color of the sky and the effect of distance haze.

All combinations of these three basic effects are encountered. The color of the lips and the flesh under the finger nails is due largely to the blood, and tends to be red with little blue or yellow present. Some of the veins run close to the surface skin, and the concentration of the blood red is so high in these veins that it is effectively black. Such veins appear blue since the only color seen is the scattered blue light. Over most of the rest of the body the color shades from red to yellow-orange, or to actual yellow or brown, in accordance with race and degree of pigmentation. Because of the outer diffusing surface with its underlying blue scatter and yellow pigment, however, the appearance of skin is peculiarly sensitive to the size, shape, and positions of the light source. In general, strong parallel light such as direct sunlight or a high-intensity artificial light tends to penetrate the skin deeply, giving it a transparent appearance which disappears more or less completely if the light is from a large diffuse source. In addition, if the skin has a tendency to be at all oily, the outer diffuse surface tends to be replaced by a smooth reflecting one which may eliminate the added white light and greatly deepen the color. As people become older, the skin becomes less and less transparent, and more diffusion takes place below the outer surface. For these reasons it is apparent that the term "flesh color," refers to a range of colors and includes the way in which they shade into each other.

The effect of face powder, of course, is to increase very greatly the surface diffusion and eliminate any tendency for the skin to be shiny. To the extent that the powder is non-selective, it simply adds a large amount of white or nearly white, light to the color. If applied heavily it may substitute this for the skin color and eliminate all shading. It is customary for many people to use a face powder that is not white, and of course under these conditions this color is also substituted for that of the skin.

The rouge and lipstick colors which are used are available in such a variety of shades and colors that it is futile to discuss them. In general, rouge forms a diffusing surface and lipstick is so applied that it has a high gloss surface and a deep color.

Aside from skin and cosmetic colors, people differ radically in the color of hair, eyes, and teeth. Hair color in general forms a complete series from white through yellow, orange, red, and brown to black. Hair differs not only in color but in texture and the sheen of its surface, some being exceedingly shiny and some remarkably diffusing. Probably only one or at most two pigments are involved. White hair is due to effective absence of pigment plus the presence of colorless diffusing materials, probably tiny air bubbles. Black hair seems to be due to the presence of large amounts of pigment plus a smooth surface. Hair that appears blackest is often red by transmitted light.

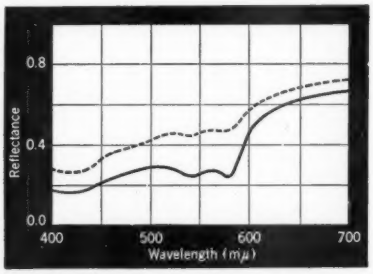


Fig. 9 Reflectance curve for skin of sacral region before solar irradiation (broken curve) and eleven hours after a one-hour exposure to August noon sunlight (solid curve). (E. A. Edwards and S. Q. Duntley, **Science**, Vol. 90, p. 236, 1939.)

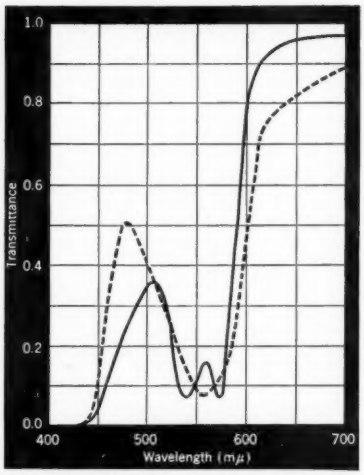


Fig. 10 Transmittance curves for oxyhemoglobin and reduced hemoglobin (broken line) diluted one to one hundred. (E. A. Edwards and S. Q. Duntley, **The American Journal of Anatomy**, Vol. 65, p. 15, 1939.)

All eye colors appear to be produced by the presence or absence of only one selectively absorbing pigment plus varying amount of scattered blue light. The one pigment is brown in color and may be melanin. The scattered light is caused by fine particles present in varying amounts or by structure. The series of colors from clear blue through gray is produced by variations in the amount of scatter in the absence of pigment. All other colors are formed by some one of these conditions plus various amounts of brown pigment. Because of the large part played by scattered light some eye colors change markedly with illumination conditions. This is particularly true of those having a tendency toward a grayish green color. In the rare case of the albino, who has no pigment at all, the eyes sometimes may be pink because of the red light reflected by the blood cells at the back of the eye. A similar very deep red

color may be seen occasionally in all eyes if the light enters the pupil in such a way that the red background of the eyeball is seen directly. This can be seen more easily in some people than in others. The difference may be due to a difference in the reflectance of the back of the eye.

The color of teeth covers a much wider range than is ordinarily supposed. It ranges from relatively deep yellow through white to bluish white.

Colors in nature

Among the other important colors in nature are those of water, soil, leaves, and flowers.

The true color of clear water seems to be a pale green, although this color is not seen unless the light passes through a considerable distance of the water. In any given locality, however, the color of the water may be affected markedly by the presence of dissolved materials or of tiny marine life. These effects may change with the temperature of the water and may also be modified by the presence of finely divided sand and the like held up by the motion of the water. Thus the color of water may range from an exceedingly deep blue through many shades of green to practically colorless. In large bodies of water these basic colors may be modified by surface reflections. On a calm day when the surface is completely smooth, the surface reflection of the sky and the clouds is obvious and the observer tends to see it as separate from the water color. However, when the wind ruffles the surface or in bodies such as the ocean where the water near the shore is almost never smooth, the sky reflection becomes mixed with the color of the water, and the mixture is seen as a single series of colors.

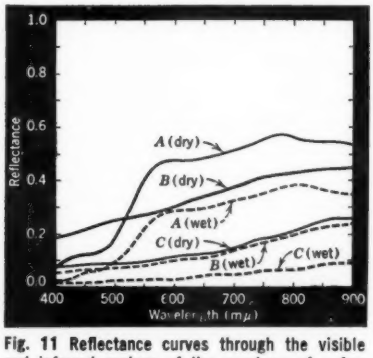


Fig. 11 Reflectance curves through the visible and infrared regions of the spectrum of a few typical samples of soil.

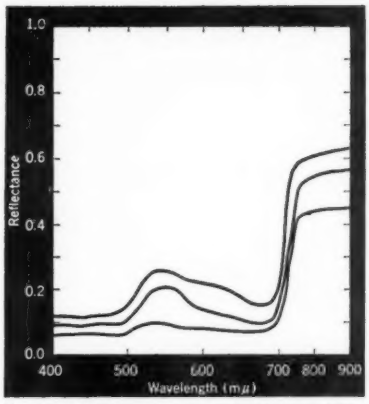


Fig. 12 Reflectance curves through the visible and infrared regions of the spectrum of some green leaves.

If the sky is uniformly blue, this is the only color added. If the sky is non-uniformly clouded, the colors reflected will change with the direction in which the observer looks. Such reflections do not follow the laws for smooth surfaces in that the part of the sky reflected may be in an unexpected position relative to the observer, even directly behind him, since the determining factor is the angle that the ripples make with the line of sight. It is quite possible, although only clear blue sky is directly in front of the observer, for the water to reflect no visible blue if the rest of the sky is heavily clouded.

Soil colors vary in hue from red to yellow and cover a wide range of saturations and lightnesses. They include almost all varieties of brown from those that are nearly black to some that are quite light. Wet soils are always darker than dry soils and are usually slightly more saturated in color. The redder brown soils usually become yellower when wet. Spectral-reflectance curves of a few typical soils are given in Fig. 11.

Colors of leaves differ considerably for various types of plants and during different seasons. As with most other objects in nature, leaves have slightly differing colors depending upon the particular direction with respect to the surface from which they are illuminated or viewed. While detailed information on all these variations cannot be given here, spectrophotometric curves of a few typical green leaves are shown in Fig. 12. Of particular interest with respect to these leaves is the reflectance in the infrared.

The greatest range of selective surfaces in nature, of course, is that of flower petals. These are second only in their selective action to some of the recently detailed textile dyes. Reflectance curves for some of the well-known colors are given in Fig. 13. For comparison, several of the more intense textile dyes are given in Fig. 14.

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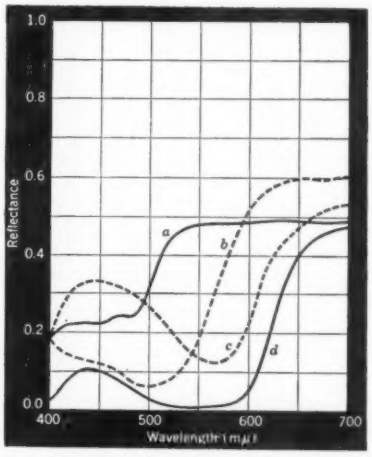

Fig. 13 Reflectance curves of some common flowers: (a) desaturated yellow gladiolus, (b) bright orange gladiolus, (c) pale violet rose-of Sharon, (d) wine-colored gladiolus.

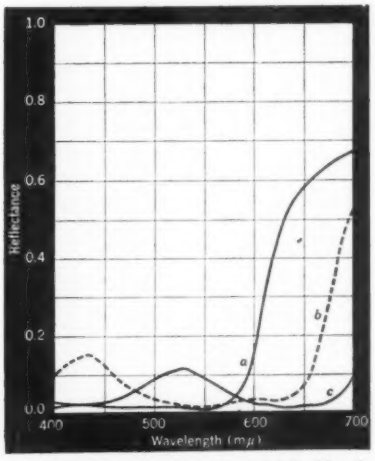

Fig. 14 Reflectance curves for dyed felt: (a) red (b) purple, and (c) green.

WE LOVE CUS

SAM LANG

K & L Color Service, New York, N. Y., reports that:

Photographers should keep records of previous work and correlate their experience with the changes in film and color materials which are constantly being announced.

Too many photographers send film to their lab improperly packed. Never use a paper box; use triple boxes such as the boxes the film comes in.

Apart from mechanical problems —poor instructions, improper packing, etc.—the major technical faults seem to be poor exposure and false meter reading. This can be due to such things as not resetting the exposure index after using the meter with black-and-white film or even forgetting to compensate for bellows extension in close-up work.

Some photographers forget what film is in their camera and use indoor film outdoors and vice versa.

Sometimes a photographer who shoots 35mm will send us reloaded cartridges. The only trouble is that the film now in the cartridge was different than the film marked on the cartridge and the photographer didn't tell the lab about it. Or sometimes a photographer will cut sheet film down and chop off the notch. Unless we are told, there is no way of knowing what film he is sending to us.

In choosing a lab, you can go by word-of-mouth reputation or, best of all, send samples to various labs you are thinking of using. A good lab should not only offer good quality and service but maintain consistency. A good lab will keep accurate controls and records for every job so that it can tell you what went wrong if you have complaints. Above all, remember that a lab can do only what you tell them to do with what you send.

ULRICH MEISEL

Meisel Photochrome Corp., Dallas, Texas, reports:

Too many color photographers fail to follow directions on correct filtration. When using a color negative material with fluorescent light, for example, unless the proper filter is used, the negative will be so far off-color that it will be virtually impossible to correct in printing.

A common fault, too, is using two emulsions, the same film but two different batches. Often, the photographer will shoot a grey card from one emulsion and make his pictures on the other. Well, for all practical purposes, that grey card is useless. In color, all tests and pictures should be on the same emulsion number.

In using positive film, it is important to pre-test before doing serious work on that film. Only in testing can a photographer really get to know his film.

With negative film, testing is important but not as critical as with positive film because some correction is always possible in printing. Remember that both negative and positive color films are variable from emulsion to emulsion. Therefore, testing is the basic step in getting good quality from your film.

Keep careful records so that you can learn from mistakes and, also, from the fortuitous accidents when for no apparent reason, a superb quality is attained. Accurate records can transform "lucky" accidents into routine procedures.

ED PURRINGTON

Meteor Photographic Co., Detroit, Michigan, reports that:

Too many photographers fail to give the lab sufficient information. For example, some customers don't even specify the quantity and size of prints desired or provide delivery and shipping instructions.

If you want a negative cropped, don't mark up the film but either make a black-and-white print and crop that or use a glassine envelope and mark that. This method is not always good, however, because the glassine may slide and the crop marks cover a different area.

If there are any special effects that you tried for, tell the lab. Sometimes you try your best to make a good print from an underexposed negative and then the photographer tells you that he wanted a night effect. Tell the lab if you push; with color negative material, slight

ED PURRINGTON

...A LAB'S-EYE

TOMERS, BUT..

overexposure is not as bad as underexposure. With transparency material however, your leeway is in the direction of underexposure, rather than overexposure. But don't carry your exposures too far from recommended indexes unless you know just what you are doing.

Don't ignore manufacturer's instructions. If you have to vary them, make tests first before shooting important pictures using a new technique.

In sending negatives to be printed, indicate cropping on only the most important dimension and let the other dimension fall as it will. Learn to scale pictures properly. Use the conventional cropping symbols, a straight line for exact cropping, a wavy line for approximate cropping.

Above all, if in doubt, contact your lab and let them know what you are doing and what you want.

T. H. EMMETT

Hollywood Film Enterprises, Hollywood, Cal., reports that:

A common fault we find is that customers do not identify the effects they want properly. In our price list, we have a guide on how to prepare cue sheets and how to indicate the instructions to the film editor. If anyone wants this information, all he has to do is drop us a line.

Other faults we find are improper splices. In splicing color film, both sides of the film should be scraped because the film is thicker than black-and-white. Sometimes we find difficulties in exposure or lighting, especially in the case of in-plant photographers who have no chance

T. H. EMMETT

to set up. If the cameraman thinks his exposures are in any way off compared to the normal recommended index, he should tell us. Very often, these can be compensated for during printing. If possible, send a test film to the lab so they can check your exposures.

If you want special effects like fades or dissolves, shoot enough film to handle these. Too often, the cameraman wants opticals but doesn't leave enough film to work with.

In general, get to know your lab and the people in it. They are in business to give you want you want. All you have to do is tell them what you want plainly and in time to do a good job.

ALLEN HILLIARD

George W. Colburn Laboratory, Chicago, Ill., reports that:

Problems sometimes arise when the producer is unfamiliar with the critical step-by-step operations which the laboratory must carry out for his film.

When this happens, we may not receive the original film or sound material in time to meet the expected delivery date.

Sometimes ideas for desirable features are abandoned, simply because there isn't enough time to incorporate them in the film.

Other problems arise when the inexperienced producer is not fully aware of the effect that certain original film deficiencies will have on the quality of the finished print. Although some printing corrections are possible, the best quality prints will be made from clean, undamaged, normally-exposed originals.

Many of these problems are resolved as experience is gained. However, we encourage new producers to discuss their film plans with us in advance of production. Such a conference is likely to improve the chances for faster delivery of an economical, effective film.

JOSEPH HOOPER

Byron Motion Pictures, Washington, D. C., reports that:

Too many customers fail to include detailed instructions with their film, or even give us basic information such as whether the film they sent was negative or reversal stock. They should also tell us when they want their film, how we should ship it and how it is to be mounted, whether on reels or cores or cans.

We are working on a lab order form which will include all necessay information so that all the customer will have to do is check the appropriate space.

We have here at Byron bulletins

(continued on page 78)

VIEW OF YOU

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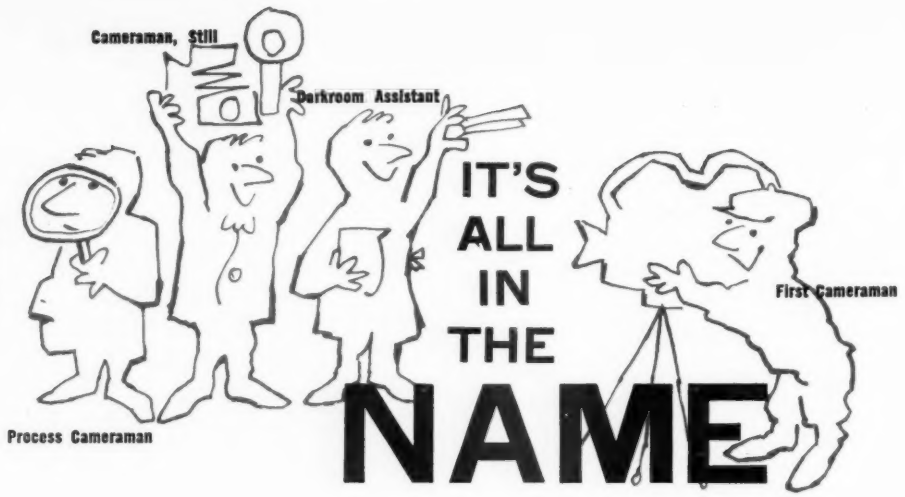


IT'S ALL IN THE NAME

The title a photographer carries not only tells what he does but it can reflect his firm's opinion of what he's worth. Here is a not-so-merry nomenclature mix-up

Like Army uniforms, job titles tend to come in two sizes, too big and too small. This is as true of photographic titles as of any other field in industry. Typical cases include the Chief Photographer of a one-man section (himself) and Cameraman for a man heading a combined photo and repro unit with a technical knowledge of both fields.

While there is a certain personal satisfaction in titles, the real importance of adequate job titles is felt where it can do the most good, on a paycheck. A quick look at the title situation in photography discloses a state which might be termed cheerful anarchy. Not only do titles vary from industry to industry but from company to company. In one firm, a Photographer does no darkroom work. In another, he not only handles photography but graphic arts. In a third, he may handle anything involving a camera, still or movie.

Before going into the question of job titles in photography, it might be useful to figure just what use, if any, titles and job descriptions are in practical terms. Any title should serve to establish a relationship between the holder and his co-workers. If the vice-president wants to know who is the man to blame for his out-of-focus pictures, he can call the Chief Photographer. The Chief Photographer can yell at any Senior Photographers within earshot. They can, in turn, give the lab assistant 30 lashes with a wet cable release. The titles define the relationship of the employees in the rank structure of a company.

Job titles can also define duties. Obviously, if a man is called a Mechanic, he would not be expected to handle photographic chores (not normally, that is. In photography, almost anything is possible.)

A man whose title is Cameraman, Still, will most likely perform duties different than those performed by a Laboratory Technician. Along with defining duties, it provides some standard for promotion. The Assistant Cameraman knows that his next step up will be Cameraman and the step after that, Senior Cameraman.

The phrase "job description" sneaked in with "job title," several paragraphs back. The two are faces of the same problem. Before you can get a job title, you first get a job description, giving all the functions handled and then fitting a title to go with these functions. In some cases, adding a function or two may help get a higher salary than merely listing the most frequent or usual duties. A case in point occurred when one manager gave his people slight administrative duties in addition to technical duties. When listed in the job description, they helped convince Personnel that as fellow executives they deserved more pay than as simple coolies. Personnel people are very alert to managerial responsibility, no matter how slight. While they have the responsibility for job classification, often it is the photo manager who gives them the duty assignments, qualifications and other particulars concerning his section.

What are some of the qualifications which go with titles in typical photo sections? In the Federal Civil Service, one title, Photographer, is used for several grades (GS 3 to GS 9) at starting salaries from $3760 to $6435 per annum. The duties for all grades are similar. A still photographer takes and processes photographs, while a movie photographer handles both camera and lab operations. The main differences are in levels of skill and experience. For GS 3, only one year of experience is required. For GS 9, five years of experience (including supervisory experience) is required.

Most in-plant sections have similar titles for photo personnel although the work as written in the job descriptions may be different. In one firm, for example, there are both Cameramen and Motion Picture Cameramen dividing the still and movie assignments. In another firm, there may be a Photographic Technician who is expected to handle both still and movie. In a third firm, the rating of Photographer may cover still, movie and darkroom work while in a fourth, Photographers cover still and movie work but there are lab technicians for the darkroom. In other firms there may be process cameramen for repro work, and perhaps a breakdown of Darkroom Technicians between a Junior who mixes chemicals and washes prints and a Senior who takes care of color and black-and-white printing.

The general ranking, despite the variety of duties included under each title, starts with a Junior Pho-

tographer who may either be a beginner (in which case some firms rate him as an Apprentice) or have a minimum of experience required to work under supervision. This experience may be amateur or service or, perhaps, photo school. The next step is Photographer, the basic journeyman rating. He is expected to be able to handle the simpler assignments independently, working with a variety of cameras. In some cases, this is broken down as Photographer I and Photographer II.

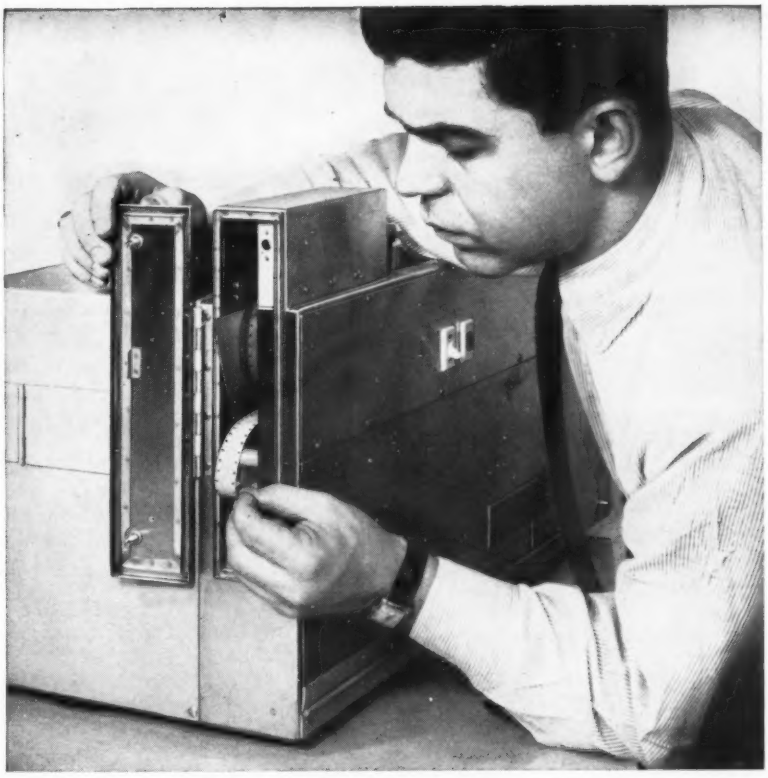
The next step is usually Senior Photographer. He is expected to perform to highest standards and be able to handle every type of assignment. Not only does he work without supervision but he may have to supervise lower rated photographers and to teach the new men in the section. In the absence of the Chief Photographer, he has direct charge of section operations.

The Chief Photographer has direct supervision over the section including assignment of photographers and daily operation. This title is still not clearly defined: in some sections, he reports to the manager or supervisor of photography or to a similar person. In others, he is the manager of photo operations reporting to a higher executive for whom photography is merely one phase of operations he supervises.

Who's on first?

While this pattern describes, in a general way, the organization of most in-plant sections, it does not include the wide variety of titles now in existence. Some firms have Camera Technicians, Photographic Technicians, Photographic Specialists, Still Photographers, and Movie Photographers, Laboratory Technicians, Motion Picture Technicians, Printers, Chemical Mixers, Print Finishers, etc. All these titles, of course, have meaning within the particular section or firm.

But what happens when a man changes jobs? How can a prospective employer know what a man does if he says he was a photo specialist when there is no copy of the job description available. Usually, if the man sounds convincing, he is taken at his word and hired. Often it is pure chance whether he performs according to his promises or turns out to be a dud. If a man comes and says he was a Photographer II, what does that mean? Is he a good studio man or commercial man or maybe a jack-of-all-trades with no outstanding ability in any one field? Must a job description accompany each title?



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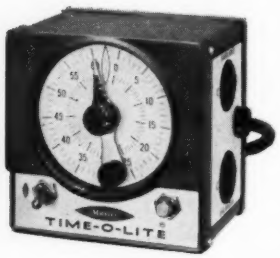

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Samuel Lang & Leonard Zoref

INDUSTRIAL COLOR

He looks like a lobster, she a swan; what does it, asks reader

We're always pleased to get questions from readers. We feel that it gives us a chance to be truly helpful to the questioner, and clear up a few points that may be puzzling to people who don't get around to dropping us a post card or letter. (In case you want us to field a bedevilling problem of yours, write us c/o PMI, 33 W. 60th St., New York City 23. We ask that queries be signed, but we'll customarily withhold the names.)

A lot of proficient color men have problems which they themselves feel should be elementary, but are tough to lick nonetheless. One class of such problems is the type which could arise from an inherent characteristic of color film—or be the result of any number of relatively minor variations in technique. Unless a photographer has a chance to compare notes with a lot of other users, he really has a tough time finding the solution.

Blushing subjects

A case in point is a query from a Columbus, Ohio, man. It seems that he has been unable to get a satisfactory explanation from anyone as to why a color film accentuates a ruddy or slightly sunburned face. He claims that for all its niceties, Ektachrome E-3 has been giving him an unusually vexing time in this respect. In one case with three models, one (a woman) photographed beautifully, while the other two in the picture (both men) were reddish looking.

Hold your hat, Watson

While there is not enough evidence to stake our life savings on our conclusion, this last bit of datum furnishes what we think is a good clue to the problem: the color of the subject's skin, and contrast.

In order to expose properly for the woman's face, the picture was, comparatively-speaking, under exposed as far as the male subjects were concerned. This difference was accentuated by the fact that all three faces were in the same photograph and thereby subjected to direct comparison.

If this is the problem, as we suspect it is, there are at least two possible solutions.

An obvious one would be for the photographer to make-up the men's faces. The woman is undoubtedly using make-up, which serves to cover up any sunburn and whiten her skin. We would suggest theatrical makeup, as opposed to street makeup for all the models. It usually is designed with photographic purposes in mind.

The writer feels that Ektachrome E-3 is partly to blame. There is a certain amount of truth in this because E-3 Ektachrome has a tendency to be slightly warmer than other color films. But this is not a debilitating factor. The use of a CC05 green filter should subdue the reddishness and bring back the flesh tones a bit more brownish. This filter is weak enough not to noticeably affect most other colors, particularly where flesh tone is the most important part of the picture.

Despite appearances, flesh color is really a combination of all the colors of the rainbow and then some. Close observation will reveal furthermore that their total effect is anything but uniform from person to person. (See *The Physics of Everyday Color*, page 46).

Color film will record these differences, but not necessarily in the way that the eye sees them. It may *exaggerate* visual color differences.

In other words, there is a certain amount of unpredictability involved in color portraits. If nothing else, a consistent makeup job will help straighten out this haphazard situation. Again, theatrical makeup is recommended.

A new publication by the Eastman Kodak Co. on the subject of

portraiture touches on some of these problems. Called *Studio Techniques for Portrait Photographers* (0-4), it deals essentially with lighting as a principal tool of the photographer and discusses techniques for achieving suitable skin tones.

In a section called "Getting Started in Color," it outlines the color negative film system and covers such aspects as makeup of the subject for color, and interpreting the color negative; and gives suggestions for working closely with commercial color finishers for custom services.

Reflections from foil

The same questioner wants to know if foil reflectors are as satisfactory for color as they are for black-and-white. He wonders if there is not a tendency to oversaturate the color.

Well, foil reflectors are useful for color. White metal foil has the advantage of not reflecting its own color onto the subject, but rather mirroring the color of the source it reflects. Depending upon how smooth they are, foil reflectors do tend to be less diffuse than, say, a white card. And, depending on the situation and the terrain, this may affect the saturation of the color reflected from the subject, especially if the subject has a glossy surface. For some purposes this could be good, for some bad. It certainly doesn't rule out the foil reflector, however. Some magnificent color pictures are made with its help.—THE END

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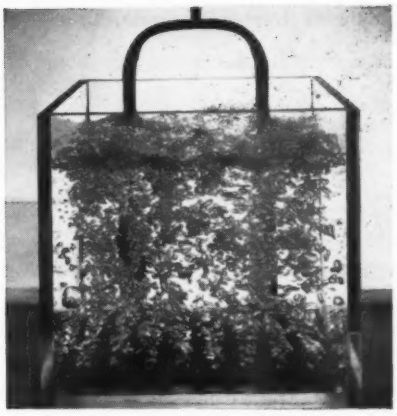

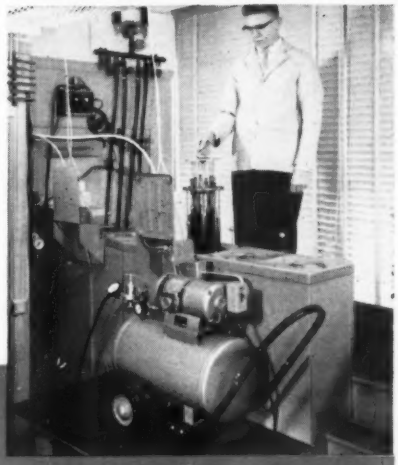

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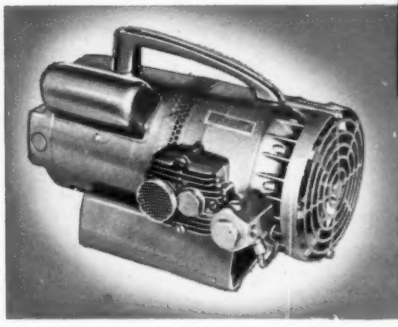

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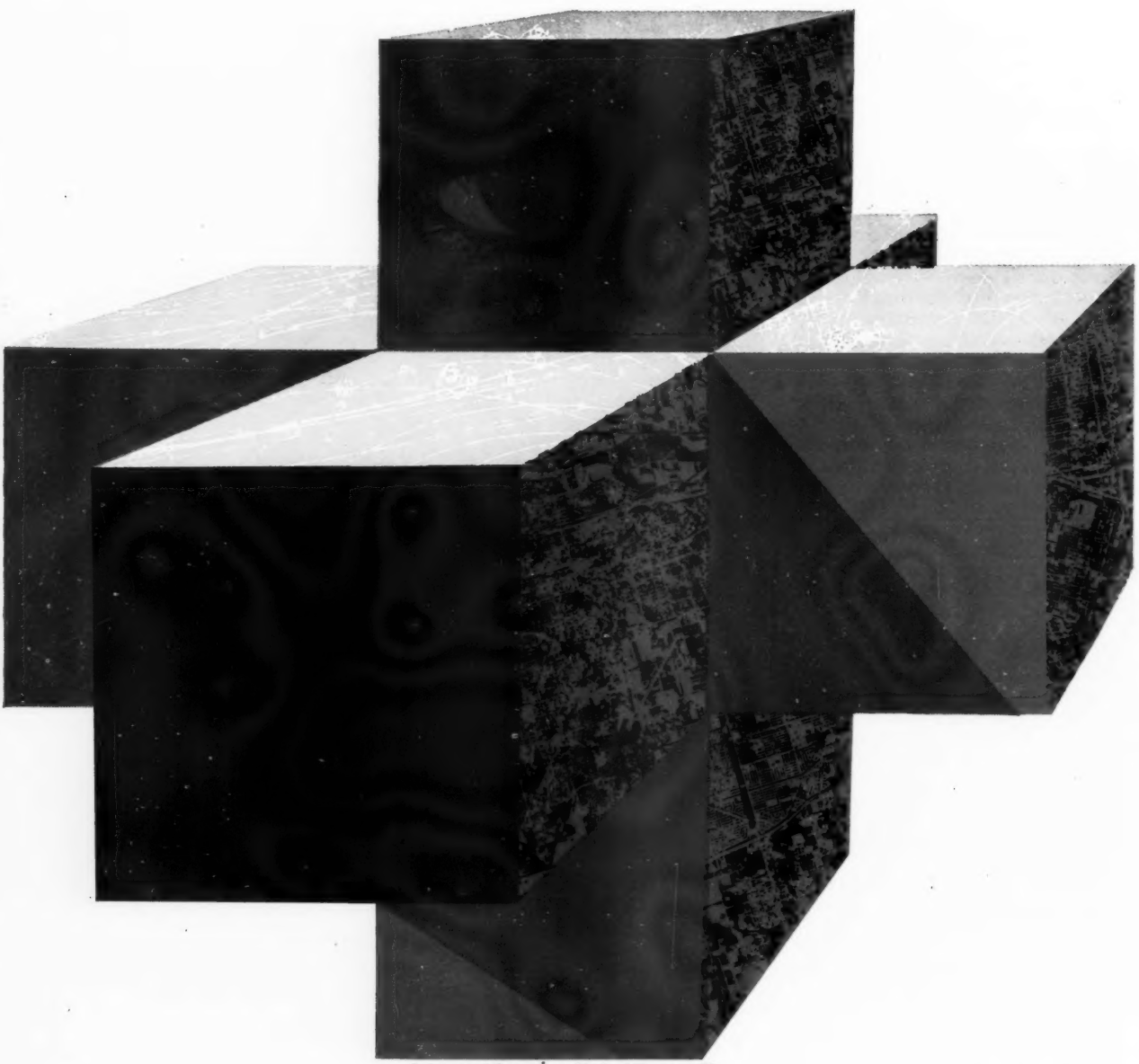


Get more information. Circle 445, page 79

PMI PHOTO INSTRUMENTATION SECTION

HYZER ON HIGH SPEED

High-speed's trickiest problem: getting the camera and subject going simultaneously—W. G. Hyzer

What single application for sprocketed film accounts for the most footage consumed in high-speed photographic practice today? This is a trick question, so don't feel too badly if your answer doesn't jibe with mine.

Actually, I am referring to the photosensitive film that is used as a leader while the camera builds up to operating speed. Fifteen or 20 ft. of film is consumed during a typical camera acceleration. Usually the event is recorded on a total of 10 ft. of film or less. What happens to the remaining 70 ft.? Usually this film is knowingly wasted to provide a safety factor of time required in synchronizing the camera and event. In addition, an undetermined, but certainly a high percentage of film rolls are completely unusable because the operator missed the event entirely.

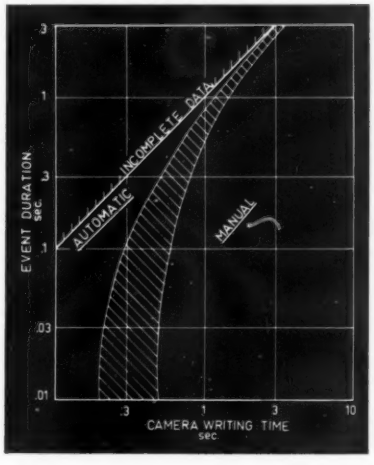
If you operate a rotating prism camera, you can't do too much about the acceleration characteristic, but you can improve your technique of reliably capturing the event on usable film. If you shoot a lot of film over a period of a year, genuine economies are possible by using shorter than standard-length rolls. In fact, a rotating-drum type camera—Beckman and Whitley's Dyanfax, for example—which uses short lengths of film and can be brought up to speed without spoiling film, may pay for itself in film saved if it is operated an average of four or five times a day over a period of a year. With short lengths of film, synchronization problems become more acute, but it is surprising how a little ingenuity can go a long way towards solving what at first appears to be an insurmountable obstacle.

Automatic synchronization techniques will be thoroughly covered in forthcoming columns, but this month let's touch on those applications where an automated approach is downright impossible. Also, this preliminary article will serve as a springboard for future discussions on this highly important subject.

Effective synchronization technique depends upon 1) sensing or controlling the event and 2) introducing the required time delays so its occurrence coincides with operation of the camera (or light source in the case of electronic flash). The human eye (and sometimes the ear) is used as a sensing element for manual synchronization. The eye requires about 1/100 sec. to perceive a stimulus and it retains the sensation for 1/20 sec. after the stimulus is removed. Physical response to perception of the stimulus is both irreproducible and highly dependent upon numerous uncontrollable factors, both physical and psychological.

Physical reaction time is about 1/5 sec., but this varies considerably between individuals and depends upon their mental and physical condition and environment at the time the act is performed. Loud background noises for example, tend to reduce response rate and hamper the ability to perform an otherwise simple task. Human errors mount rapidly with the heat. Rate of making errors becomes increasingly greater at temperatures exceeding 92°F. Fatigue and mental stress also contribute to error of response. Under stress an individual is apt to revert to the procedure he learned first in performing a task. This can easily result in wasted film and an unrecorded event because the operator pushed the camera and event buttons in the wrong sequence despite several successful "dry runs" made immediately before the actual test. It naturally follows that a person less apt to suffer from making a mistake in response or judgment is perhaps best qualified to push the camera button at the precise time. Try this argument on your boss

(*continued on page* 86)



When can you trust your reflexes? Sometimes a photographer can depend on manual synchronization between camera and subject action in high-speed work—sometimes he can't. This chart tells roughly if and when the senses and coordination can be relied upon—with events lasting from 1/100 to 3 sec. and camera writing times from 1/10 sec. to 10 sec. The triangle in the upper left hand corner can be ignored, it indicates "incomplete data" when the camera does not run long enough to fully cover the event. The large area to the right, labelled "manual," indicates the times when human reaction is quick enough to be relied upon. The cross-hatching indicates an area of doubt—if you're fast you **may** be able to "catch" the event. "Automatic" indicates the sector where mechanical synchronization is a practical necessity, human reaction is too slow for the job.

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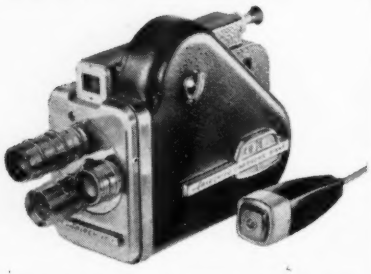

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Ernest E. Reshovsky

PHOTO INSTRUMENTATION

What troubles the astronomers? The sky always gets in the way!

Project Stratoscope, in which high performance optical systems are lifted by unmanned balloons to altitudes above nearly all of the atmospheric turbulence to photograph stars and planets, was started in 1957.

At that time a 12-in. aperture telescope camera was flown to more than 80,000 ft. to photograph the surface of the sun. A second series of flights, with the same equipment, was made in 1959. The Project Stratoscope 1 solar telescope obtained the most detailed and sharpest pictures ever taken of the sun.

Project Stratoscope II, sponsored by the Office of Naval Research and the National Science Foundation with support by NASA, is under the direction of Prof. Martin Schwarzschild of Princeton U.

In preparation for flights during Project Stratoscope II a new 36-in. airborne telescope system is being designed and built by Perkin-Elmer Corp. The same firm also built the 12-in. aperture telescope-camera system used during Stratoscope I flights.

The Stratoscope II telescope-camera will be L-shaped, with one arm nearly 18 ft. long. In flight, the train—consisting of telescope-camera, shroud lines, recovery parachute and balloon—will be over 500 ft. long.

All silica and a yard wide

The telescope's primary mirror will be a 36-in. aperture, f/4 paraboloid with a theoretical resolving power of 1/10 sec. of arc. This is the equivalent of distinguishing two objects 15 in. apart, 500 miles away.

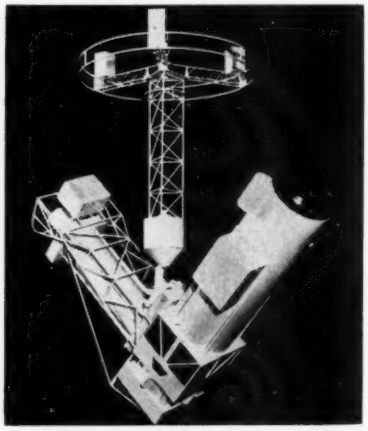
The mirror, which weighs 400 lbs., is fused silica, its surface polished to one millionth of an in. accuracy.

The secondary optical system, which relays and magnifies the image onto the photographic focal plane where it will be recorded on 70mm film, will provide an effective focal length of 300 ft.

In operation, once the 4500-lb. instrument has been lofted by its carrier balloon to the desired operating altitude above the earth's atmosphere, it will be controlled and roughly aimed by radio command signals from the ground. Final precise aiming will be accomplished automatically by sensing and control equipment built into the telescope.

Telemetered signals from the telescope in flight will indicate its orientation with respect to magnetic north, and its elevation angle. A "coarse" television camera will provide ground observers with a 10-degree field of view of the sky for rough orientation. Through ground control signals, the telescope's position will then be progressively improved. When this is done, the field of interest will be visible through the telescope's primary optical system and viewable on the ground through a "fine" television camera. By further ground commands, the telescope's aim will be corrected some more to within 1 min. of arc of the correct position.

At this stage another ground sig-



Astronomer's delight: scale model of the 2¼-ton unit for Stratoscope II

nal will actuate an electric-optical servo system on the telescope, which will accomplish final aiming automatically.

When the telescope is precisely aligned with its target, ground command will activate the 70mm camera to record the image for study after recovery of the instrument by parachute.

New radio-controlled housing

Several instrumentation photographers of our acquaintance have at times expressed a need for an efficient, yet simple remote-control camera housing.

We have seen a few home-made solutions to the problem ranging from Rube Goldberg-like modified model airplane radio controls to more elaborate fail-safe installations. Some have worked beautifully and others have failed miserably, or been set off by random signals well before the time they were needed. We remember one case when a passing radio-equipped jeep fired nearly all cameras of newsmen assembled at Vandenberg AF Base prior to a satellite firing.

A commercial solution to this has just come to our attention and we are glad to pass it on.

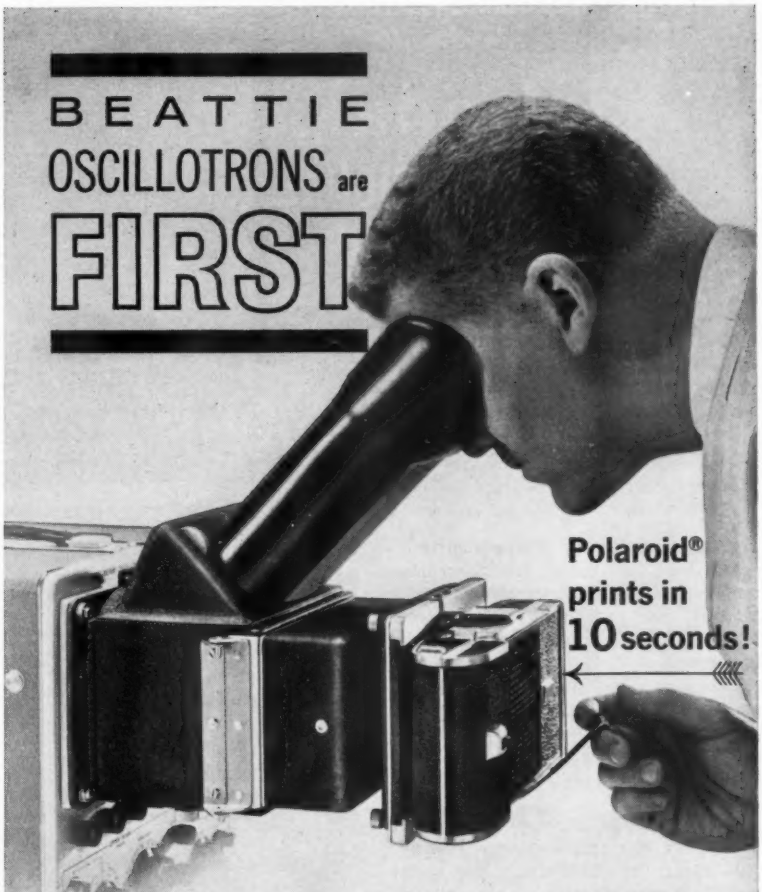
Photo-Metric Instruments, Inc. in N. Hollywood, Calif., has designed the PM-101RC radio controlled protective housing which will accommodate the following cameras: Benson-Lehner HS-16B-400; Fairchild HS 100; Millikin DBM3 & DBM4; Photosonics 16-1B; Wollensak Fastair and others of similar configuration.

The housing itself, made of fiberglass, will protect its contents from most adverse environmental conditions, such as sand storms, rain, etc. Its inside is lined with styrofoam material as insulation against abrupt temperature changes and to minimize danger of condensation.

The housing contains a transistorized multi-channel Citizens Band receiver, which is protected from random signal interference by a combination of frequency and tone. A random signal would have to hit both at the same time to actuate the camera within the case, an event very unlikely to occur.

A self-contained selector switch in conjunction with a multi-channel transmitter allows several installations of various camera positions to be started at various times from the same transmitter.

The units have been successfully operated under field conditions at distances well over 10 miles.—END



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Kodak
PROFESSIONAL ROUND-UP

Ways for half-grade contrast

Constant practice and the familiarity it breeds long ago taught the discerning professional that *kinds* of photo papers were different. Different in many respects. But for this discussion, let's stick to contrast.

Every professional photographer knows that no matter how abundant his skill, how complete his equipment, there will be the occasional negative that would print best on an "in-between" contrast grade.

Now, of course, it *would* be possible to belabor the situation and provide half-degrees of contrasts in the most popular Kodak papers.

Sounds silly and costly today, doesn't it? Especially when the same close contrast control—*to the half grade*, plus even selective contrast control within a single print, is possible, practical, and being done daily out of one box of quite remarkable paper.

This box may contain one of three papers, each with a different speed and image color, but all with the same half-grade contrast range. The names? 1. Kodak Polycontrast Paper 2. Kodak Polycontrast Rapid Paper 3. Kodak PolyLure Paper.

Which one is for you?

All three, quite possibly. Polycontrast Paper has medium speed, warm black tone. Polycontrast Rapid has a somewhat colder tone, and greater speed. PolyLure is a warm-toned portrait paper. With reduced illumination, Kodak Polycontrast and PolyLure Papers are fine for contact printing—lend a new uniformity to contact prints and enlargements.

Since the same techniques yield the same high quality with all three papers, you might well want to have yourself ready for *any job* by keeping some of each on hand.

No, these are not "emergency" papers

These papers have acquired a reputation in some circles as "emergency" papers—the box you reach for when you've got a negative that won't yield a good print on regular paper.

True, as we'll see later, Kodak Polycontrast Papers do have the ability to put new life into what once may have been a hopeless negative. But because all three have this talent for making high-grade prints in unusual situations, it follows that they can also do a high-grade job in normal situations.

One paper—seven contrast grades

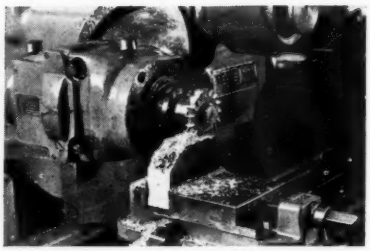
There are seven contrast grades built into each sheet of Kodak Polycontrast Papers. Grades 1, 1½, 2, 2½, 3, 3½ and 4.

These papers eliminate the need for stocking numerous grades of the same paper. Result? Less inventory. Less costly inventory. No seldom-used grades to go out of date. Since there's now just one box of each to buy, that box can be a big one—with resultant quantity discounts.

You sacrifice no quality at the altar of convenience when you use Polycontrast papers. In fact, you'll probably note a new depth, a new brilliance in your prints. That's this paper's high *d-max* at work. All three types have it. Naturally, this means blacks with depth, a long tonal range, and new snap in print contrast, as you'll see it.

Let's put the principle to work

Even under closely controlled exposure conditions, such as in-plant setups,

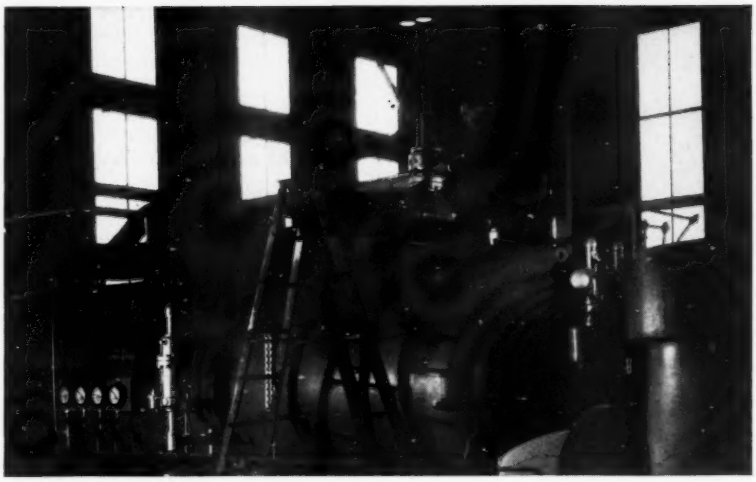


negatives of slightly varying contrast are bound to happen now and then. Contrast in these, of course, is easy to bring up or down, to just-right contrast with these Kodak papers.

Print the minus or plus negative with the appropriate Kodak Polycontrast Filter—say a 2½ for the minus, a 1½ for the plus.

On the other hand, with "normal" negatives to begin with, print them *unfiltered* on Polycontrast, Polycontrast Rapid, or PolyLure Paper for an on-the-nose grade-two result.

Now, take a situation where location shots exposed under widely varying light conditions must result in pictures that will be used together, and the advantages of this paper's flexibility multiply. Such pictures can be printed with enough contrast juggling to make them suitable for a portfolio presentation.

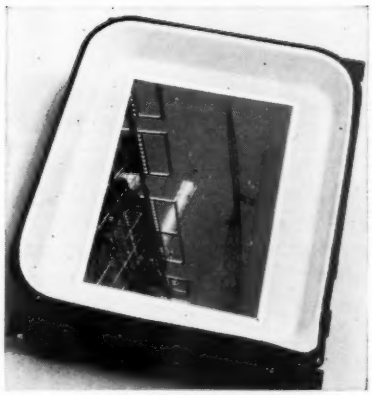


And when the worst does happen...

Every now and then every professional has a negative that defies printing... and it's a picture which cannot be taken over. Polycontrast papers may save the day.

If, for example, the negative is a confusion of varying contrasts and results in a print like the one above, you expose each different contrast area through the appropriate Polycontrast Filter, while dodging out the other areas. No, it's not simplicity itself, and you won't be doing it every day, but it's nice to know that these three Kodak papers prepare you for such an eventuality. For with any one of the three, you can correct such a print to the same extent as we have done with this one.

All the boxes of single-contrast paper in the world wouldn't do this job.



Here's what Kodak Polycontrast Papers won't do

They will not change density from developer to hypo. Will not curl in developer or wash water.

Will not change tone when dried on a hot drum. Will not limit you. Any negative, any technique (even contact printing) goes well with them.

For many, the all-purpose paper

Industrial photographers, for instance, applaud the versatility of Kodak Polycontrast Paper. They find it equally adaptable to in-plant, location, or product shots, even executive portraits. Then, too, one box of Polycontrast gives the speed they need for making large quantities of glossies, plus (with reduced illumination) enough flexibility to make contact prints. If the prints are to be shown together in a portfolio or display, there's no worry about matching tones.

What it takes...

To unlock the seven contrasts built in, you need a Kodak Polycontrast Filter Kit, or a set of Kodak Polycontrast Acetate Filters for the enlarger lamphouse or contact printer.

If you haven't already done so, you'll want to replace your safelight filters with a Wratten 0C. You may note a slightly lower light level, but it pays dividends in safety—with any paper.

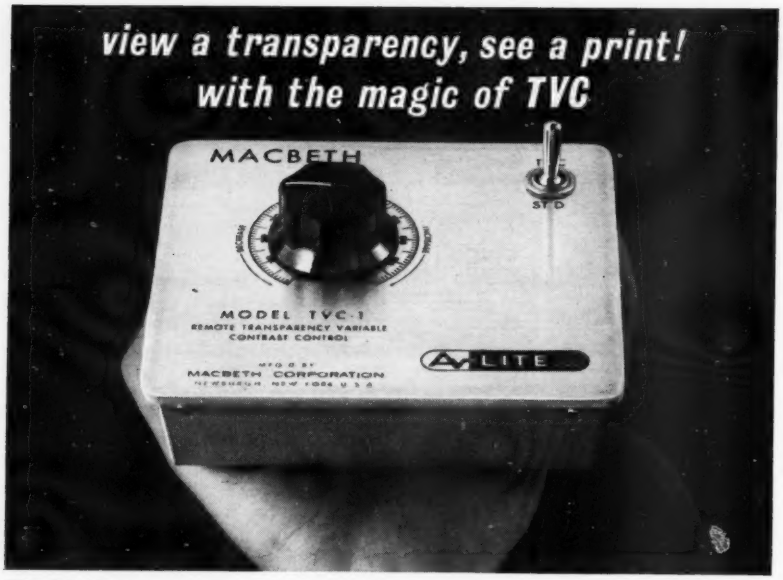
There are no changes in chemicals, washing, or drying.

Ways well worth talking about

The change-over from a single to a multiple-contrast paper is hardly an involved one, and the more meticulous you are, the more it behooves you to at least talk to your Kodak Technical Representative about the ways for half-grade contrast. Even if you have never felt the need for such close control, he can demonstrate to you how Kodak Polycontrast Papers can help you. Order a box from your Kodak professional dealer. It could easily prove to be one of the most significant purchases you ever made.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Kodak
TRADE MARK



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COLOR PRINTS

(continued from page 41)

Schneider Componon enlarging lens. Illumination, measured at the easel with the lens wide open, is approximately three foot candles.

Making the highlight mask

When he made this mask, Andre placed the Kodak register printing frame on the easel of the enlarger. He propped the back of the frame against the enlarger supports within easy reach. Close by he placed the register punch, and by its side a box of Kodak Highlight Masking film. Next he poured a quantity of Kodak Highlight Masking Film developer into a tray, and by means of a water bath, he brought it to 68 degrees F., the correct working temperature. In two other trays he prepared a stop bath and a fixing bath.

This is the sequence he then used, and recommends, to make the highlight mask, tabulated numerically.

ROOM LIGHTS ON

1. Punch the edge strip that is taped to the transparencies, emulsion down.
2. Place the transparency in the register frame, emulsion down.
3. On top of the transparency add a sheet of Kodapak Diffusion sheet, emulsion down.
4. Stop the lens down to f/16, and set the timer for 7 sec.

ROOM LIGHTS OFF

5. Punch a sheet of Highlight Masking Film, emulsion down.
6. Add this on top of the diffusion sheet already in the frame, emulsion down. Make sure that the film fits accurately over the pegs before closing the frame.
7. Make the exposure.
8. Process the mask for 4 min. at 68 degrees F. with continuous agitation in Kodak Highlight Masking Film developer.
9. Fix, wash and dry in the usual manner.
10. A properly exposed and developed Highlight mask should read between .4 and .5 in the density corresponding to the chosen highlight in the transparency. (Andre checked his out and found it to be correct on step two of the step tablet.)

Since exposure of the highlight mask is critical, it is as well to know the effect of variations. Greater densities in the mask result in bald highlights in the eventual print. Densities lower than .3 in the mask result in little or no correction and are hardly worth the labor of making the mask. Actually mask densities from .3 to .6 constitute the usable range, while a highlight mask of .45 will suit all but the most unusual cases.

At this point, having made sure that the highlight mask is in order, Andre trims away, along its length, half of the reproduction of the step tablet that appears on the high-

light mask. He does this so that when he eventually reads his principal masks he will be able to do so both with, and without, the effect of the highlight mask densities.

Making the principal masks

For best results in internegative work the principal masks should be from 25 to 33 per cent of the density range of the transparency without a highlight mask. By referring to the chart on page 40, you can locate the D. R. for the potter transparency (1.65) and trace the dotted line through a 28 per cent mask to find the D. R. of the principal masks—in this case .45.

In terms of our step tablet this requires that highlight step No. 2 will need to have a density of .60 when shadow step No. 13 has almost the minimum density discernable of .15. Again the density range is computed as follows:

HIGHLIGHT STEP NO. 2	.60
SHADOW STEP NO. 13	.15
D. R.	.45

Andre sets up the darkroom much as before. This time, instead of Highlight Masking Film, he sets out a box of Kodak Pan Masking film. For processing he uses D. K. 50 diluted 1:4, which he prepares and sets out in a tray. He uses a water bath, as before, to maintain temperature, again at 68 degrees F.

This is the schedule Andre follows in making the two principal masks.

ROOM LIGHTS ON

1. Place the Highlight mask in the register frame, emulsion down.
2. Add the transparency on top of it, emulsion down.
3. Next the diffusion sheet, emulsion down.
4. Stop the lens down to f/5.6 and set the timer for 25 sec.
5. Place a red filter (Wratten 29F) in the filter slot.

ROOM LIGHTS OFF

6. Punch a sheet of Pan Masking Film, emulsion down.
7. Add it to the frame, emulsion down.
8. Make the exposure and remove the exposed film to a light-tight box.

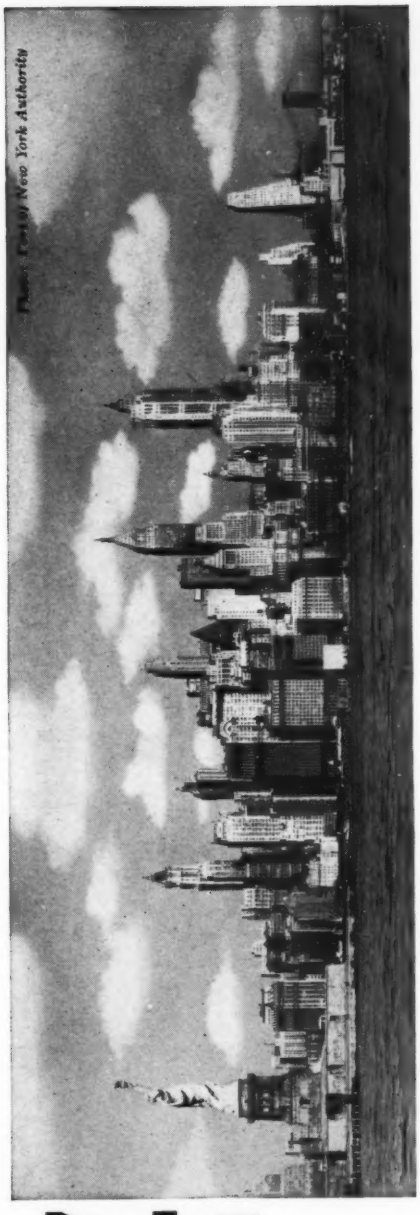
ROOM LIGHTS ON

9. Replace the red filter with a green one (Wratten 61N).
10. Reset the timer for 30 sec. The stop remains unchanged at f/5.6.

ROOM LIGHTS OFF

11. Punch a second sheet of Pan Masking Film, emulsion down.
12. Place this in the frame, emulsion down.
13. Make the exposure.
14. Process both masks together in the D. K. 50 solution prepared earlier on. Development time is 2 min. Interleave the masks

(continued on following page)



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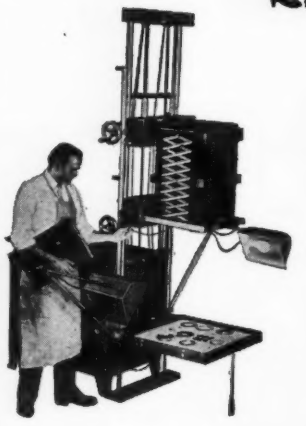

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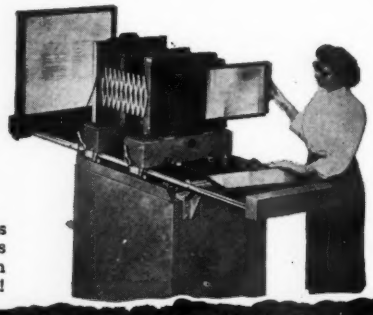

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one over the other every 5 sec. for almost continuous agitation.

15. Stop, fix and wash in the usual way. (Andre is careful to hang them both the same way round in the dryer to minimize any dimensional changes that might occur, however slight.)
16. The masks are then read on the densitometer to be sure they are correct. Andre emphasizes the point that if one or both of the masks is incorrect, it is best to remake them both.

Making the internegative

Two separate successive exposures must be made through the transparency and the two principal masks onto a single sheet of Ektacolor Type "L" film. Again the details.

ROOM LIGHTS ON

1. Place the following filters in the filter slot: a Wratten 2b plus a 10 cyan, plus a Wratten No. 12 yellow.
2. Stop down the lens to f/11 and set the timer for 10 sec.
3. Place the red filter principal mask in the frame, emulsion up.
4. Add the transparency (without highlight mask now), emulsion up.

ROOM LIGHTS OFF

5. Select a sheet of Ektacolor Type "L" film and punch it on the register punch, emulsion up.
6. Place the Ektacolor film into the frame, emulsion DOWN.
7. Make the exposure and remove the film to a light-tight box.

ROOM LIGHTS ON

8. Change the filter pack to: Wratten blue No. 98 and 10 cyan.
9. Reset the timer for 40 sec.; stop remains unchanged at f/11.
10. Replace the red filter principal mask with the green filter mask, emulsion up.
11. Add the transparency, emulsion up.

ROOM LIGHTS OFF

12. Place the previously exposed sheet of Ektacolor film into the frame, emulsion DOWN.
13. And make the exposure.
14. Remove the film to a light-tight box and process it later, without modification, in a Kodak C 22 developing kit.

Transposing the exposure conditions for a known to an unknown case is simply a matter of relating the two. For this you can use any one of the devices that relate density with time. Andre uses the Kodak Graphic Arts Exposure Computer for this purpose.

Take the internegative exposure first. Using the conditions set up in our article, the shadow density of the potter transparency is 2.00. The time of the yellow (no. 12) filter exposure was 10 sec. The time of the blue (no. 98) filter exposure was 40 sec. a ratio of 4:1.

Take an imaginary new transparency with a shadow density of 2.30. What are the new exposure conditions?

To find the answer, you use two sections of the Graphic Arts Com-

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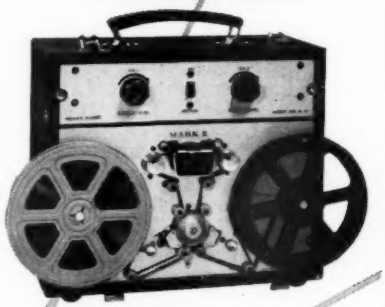

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puter, the red inner dial marked "density," and the outer scale marked "exposure in seconds." Set the original transparency shadow density on the density dial against the time in seconds of the yellow filter exposure. Then read the new yellow filter exposure against the new density without moving the dial. The result—20 sec. for the new density of 2.30. Multiplying that by 4—the ratio of blue filter exposure to yellow—will give you the new blue filter exposure: 80 sec.

Now, take the principal masks. First it is necessary to know the density range of the new transparency. When you have found this, apply it to the chart (page 40) and obtain the density range of the new principal masks. From this, compute the maximum density required in the mask. Then set the old maximum density opposite the old exposure on the Graphic Arts Computer and read the new exposure against the new density. Five minutes' practice is all you need with one of these useful gadgets to become really adept at it.

It is necessary to inject one small word of warning. Photographic emulsions vary appreciably from one batch to another. Even Pan Masking Film has been known to do this. The warning then is the obvious one. When you go from one batch to another, make a test to be sure that nothing has changed to throw you off balance. There are enough pitfalls in the color duplicating business.

Since this is the story of one man's accomplishment, using his own equipment, it is unlikely that the results will reproduce themselves exactly when transposed to other color labs. When you set out to use this useful technique in your own department, make allowances for the variations introduced by any different conditions. More than likely, Andre's figures will hold up under the new conditions, with only minor variations. In any event, the following list of publications constitute an invaluable reference library for anyone engaged in making duplicates in color, and will provide the basic formulary from which any new calculations can be derived.

COLOR SEPARATION AND MASKING (Kodak Pamphlet No. E64)

PRINTING COLOR NEGATIVES (Kodak Color Data Book)

MASKING COLOR TRANSPARENCIES FOR PHOTOMECHANICAL REPRODUCTIONS (Kodak Graphic Arts Data Book)

THE REPRODUCTION OF COLOUR by R. W. G. Hunt, Fountain Press, London

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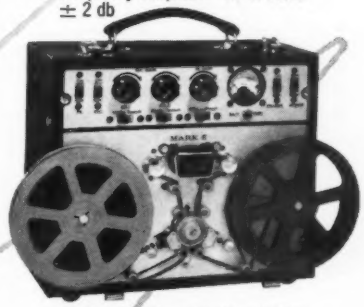

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NASSAU POLICE DEPT.

(continued from page 45)

Careful records are kept of films and paper processed and replenishers added as needed. The replenishers are kept in Eastman polyethylene barrels and are drawn off through spigots.

The entire darkroom area is air-cooled. This differs from air-conditioning in that fresh air is drawn into the building, then heated in winter and cooled in summer. Color sensitized material is kept in a refrigerator arranged with older stock at the front. Since orders are planned on the basis of use, however, this is not a problem and it is very unusual that more than one emulsion batch is in use at any one time.

Although most of the color shot is prisoner identification work, there are cases when color photographs are useful in certain types of cases. A recent example involved a police officer who shot a man who was assaulting him. The officer wound up in the hospital with severe head injuries. Color photographs, made of the wounded officer on his hospital bed, showed the type and degree of injury sustained and were used during the subsequent investigation.

In discussing the acceptability of color photographs as evidence, Chief Thornton said that his unit has not experienced any difficulty. "Any photograph", he said, "is, at best, an approximation of the scene before the camera. Black-and-white, which is acceptable, is even more of an approximation than color—even color which is not perfect. However, it is our job as police photographers to make sure that any color photographs we offer are as close to a literal recording of the subject as we can get. Thus, all our efforts here to maintain a consistently high level of color quality are dictated by our duty to turn out as accurate a reproduction as we can."

Virtually all location work is shot in black-and-white using 4 x 5 Speed Graphics and Super Panchro Press, Type B. Two panel trucks are attached to the Bureau for field use. Fitted with custom-built, foam rubber cushioned equipment lockers, the trucks are equipped with two Graphics, one with electronic flash, one with flashbulb sync. At least 50 holders are carried, plus ample flashbulbs (No. 5 and No. 22) and a spare power pack for the Strobo-Research electronic flash units. The trucks also carry tripod, lights, and the assorted items needed for pho-

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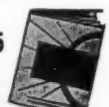

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tography in the field. The lockers are removable so that the trucks can be replaced by newer models without having to rebuild the interiors. When a new truck is used, the lockers are just slipped into the back and the truck ready for use.

This type of careful planning characterizes the whole Department. In the photo lab, for example, the tops of wall cabinets are not flat but are sloped. This minimizes the dirt accumulation and makes cleaning much easier. All working surfaces such as the counter tops of cabinets are made of acid-resistent laminate which is non-slippery. The working areas are large and clean, comparing favorably with any industrial photo department.

Although color is, perhaps, the most spectacular aspect of the Nassau County unit's work load, setting it apart from police units throughout the country with few exceptions, black-and-white is still the major part of the work, about 75 per cent of the total production.

In addition to the 4 x 5 Graphics, the unit has a 2¼ x 3¼ Graphic with a roll film back for sudden assignments around headquarters and an 8 x 10 copy camera which is used for evidential work. There is also an 8 x 10 2D Eastman View camera which is seldom used. For fingerprint work, the Bureau uses a Faurot Focuser, a close-up attachment used with the 4x5 Graphic. The unit, a variation of the focal frame, automatically indicates lens-to-subject distance and field size when the bellows is racked out to double extension for 1:1 work. This attachment (sold by Faurot Inc., 299 Broadway, N.Y.C.) has put the Graphic Fingerprint Camera in semi-retirement.

For general close-up work, a Graphic is mounted on a Graflarger stand over a light box. Illumination is supplied by the light box and photofloods, depending upon the type of lighting needed. Small items of evidence such as jewelry or weapons are photographed with this assembly.

There are two print processing and two negative processing rooms for black-and-white, equipped with stainless steel sinks and tanks. Here too, temperature and time are controlled, although the requirements are somewhat less critical than for color. Incidentally, the man developing the film is responsible for reloading the holders so that the photo truck is ready at all times.

The two black-and-white print rooms are large and well-equipped. One has two Omega D-2 enlargers

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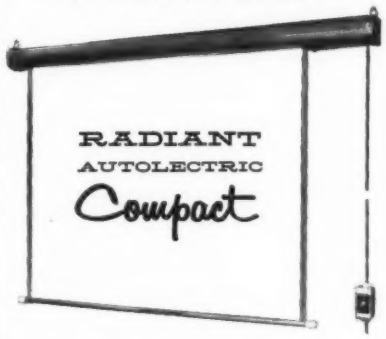

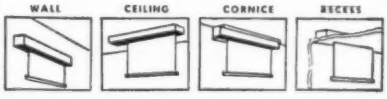

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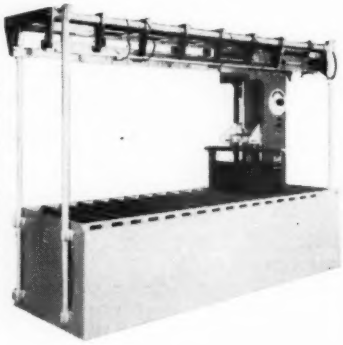

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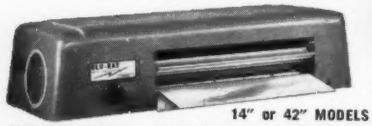

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while the other has a 5 x 7 Kodak Auto Focus. There is also an 8 x 10 Elwood for printing larger negatives. An 8 x 10 contact printer is also on hand although it is rarely used. The basic approach is the 4 x 5 negative. Graded paper is used, in this case, Kodabromide, developed in Dektol. In black-and-white as in color, methods and materials have been simplified and standardized to give the maximum quality with the minimum effort. And, as Chief Thornton remarks, "these men are police officers, not photographers. They must be able to get a good picture the first time under a variety of conditions. The only way to achieve this in practical terms is to keep photographic variables to a minimum: we are after results only."

However, photography does not stand still and the Nassau County unit is now doing some 35mm work using a Retina Reflex. Chief Thornton feels that 35mm is greatly under-used in police work despite the advantages of large film capacity, compactness and comparative ease of operation. This camera was used to make a series of Kodachromes for Departmental Public Relations use, showing all phases of the police operation. He is also thinking of investigating the 2¼ x 2¼ format. For the present, however, the Identification Bureau is a large-camera group.

Perhaps the best statement on the use of photography in police work, especially in the Nassau County Police Department, comes from the Commissioner, Andrew N. Kirk, who states: "Police photography is a specialized tool that we find of inestimable value in fulfilling our duty to the public. Like any specialized tool, its value lies in proper use under proper conditions. Its value remains only when the tool itself is kept up to date."

79

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Industrial Photo Div.
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San Mateo—Diamond 3-5300
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183 Fairfield Ave.
Bridgeport—FOrest 7-6447
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Brenner Photo Co.
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Washington—RE 7-2434
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Fuller & d'Albert, Inc.
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Washington—EX 3-8120

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Altman Camera Company
16 South Wabash Ave.
Chicago—ANdover 3-0749
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ILLINOIS (cont.)

Standard Photo Supply Co.
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Chicago—SUperior 7-3124
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Watland, Inc.
7724 South Claremont Ave.
Chicago—PRospect 8-4400
A—V—Industrial—Verifax—Graphic Arts—Microfilming

Poe's Camera Co., Inc.
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Evanston—UNiversity 4-4550
Professional—Industrial—Business Machines

Oak Park Camera Co.
1023 Lake Street
Oak Park—EUclid 6-6447
Professional—Industrial—Audio Visual

Klein's Photo Center
225 Washington St.
Waukegan—ON 2-4530
Equipment — Supplies — Sales — Rentals

INDIANA

Hoosier Photo Supplies, Inc.
1210 No. Pennsylvania
Indianapolis—ME 8-3492
Industrial — Graphic Arts — Verifax — Retail

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Olsen Photographic Supplies, Inc.
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St. Louis—CH 1-7020
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Montclair—Pl6-1234
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L. Kaltman & Sons, Inc.
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Newark—MArket 2-7154
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Schaffer Camera Co.
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Newark—MAin 2-2383
52 Yrs. Servicing Photo. Ind.

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59 Carroll St.
Binghamton—RA 4-4336
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Aims Photo Equip. & Supply
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Brooklyn—ULster 2-7300
Verifax—Graphic Arts—AV—Diazo—Ind.

Medo Photo Supply Corp.
902 Broadway
New York—OR 7-1500
Verifax — Ektalith
Graphic Arts — Industrial

World Camera Co.
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New York—WA 4-0005
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The Dodd Company
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Cleveland—MAin 1-0564

OHIO (cont.)

Arlington Camera Center
2122 Tremont Center
Columbus — HU 6-2684 — HU 8-9444—Audio Visual—Rental—Sales—Service

PENNSYLVANIA

Kadet Photo Supply Co.
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Everything Photographic

TEXAS

Patterson Photo Supplies
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FREE LITERATURE

For your copy of any free literature, circle the appropriate number on the reader's service card, attached, page 79.

AUDIO-VISUAL

REMOTE CONTROL PROJECTORS 201
Sawyer, Inc., 6-page illustrated folder describes the Sawyer full remote control slide projectors. Specifications, prices.

VISUAL SALES TRAINING 202
Vic Herman Productions, Inc. 6-page illustrated booklet describes the Vic Herman visual sales training programs.

SOUND EFFECTS CATALOG 203
MP-TV Services, Inc. 56-page catalog contains over 250 record listings covering nearly 2000 different sound effects.

TRANSPARA-FILM 204
Seal, Inc., 6-page leaflet shows step by step process of converting a tearsheet to a projectable transparency. Prices.

VIEWING EQUIPMENT 205
Macbeth Daylighting Corp., 8-page brochure on Avlite Viewing Equipment for the viewing of both transparencies and/or reflection copy.

LARGE COLOR TRANSPARENCIES 207
Colorama Photo Service, Inc., 4-page brochure describes uses and advantages of Giant-size color transparencies, which can be made up to 12 ft.

SOUND EFFECT CATALOG
Thomas J. Valentino, Inc. 30-page catalog of sound effect records from African drums to zooming planes. Write on letterhead to: 150 W. 46 St., New York 36, New York.

CAMERA & LENS

LENS SELECTOR 208
Simpson Optical Mfg. Co. 4-page folder contains chart for selecting lenses for 8 and 16mm film and 35mm slide projection.

HASSELBLAD CATALOG 209
Paillard, Inc., Catalog contains information on the Hasselblad 500C and Super Wide C with their available accessories.

INDUSTRIAL INSTRUMENTATION 210
Flight Research, Inc., 4-page folder describes and illustrates the Multi-data IV-R 35mm photo instrumentation camera and control unit. Specifications.

EQUIPMENT

FILM PROCESSORS 226
S.O.S. Cinema Supply Corp., offers price list for Allen Film Processors.

TRAID CATALOG 211
Traid Corp. 40-page catalog gives a brief resume of major Traid products with prices. Includes information on rental plan and available literature.

FILM SPLICING 212
Hollywood Film Co. illustrated catalog sheet describes the HFC automatic tape splicers. Includes list of features.

TELEVISION TABLE 213
The Advance Furnace Co. illustrated catalog sheet describes the Model 100-23 Pixmobile television table for use in classrooms. Includes price.

ENLARGERS 214
J.G. Saltzman, Inc., 4-page brochure describes and illustrates the Caesar-Saltzman enlargers with condenser type or diffused light source for precision color work. Includes specifications.

OFFSHORE SURVEY SYSTEM 215
Decca Navigator System, Inc., 8-page illustrated folder describes Hi-Fix, an offshore survey system operating on high frequencies using lightweight equipment.

POSITION-FIXING SYSTEM 216
Decca Navigator System, Inc., 4-page illustrated leaflet describes LAMBDA, a low-ambiguity, accurate position-fixing system for oceanography and hydrography.

STAR-LINE PRODUCTS 224
Camera Craftsman Corp., price list for Star-Line tanks, dryers and accessories.

Popular Pakolux Washer
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Fiberglass Tank

New PAKOLUX M-2 for
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- PLUS LOWER PRICE

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PHOTOMECHANISMS 217
Photomechanisms, Inc., 18-page illustrated booklet describes instrumentation equipment, offers problem-solving service.

"LITE-N-TIME" INTEGRATOR 218
Poly Instrument Corp., illustrated folder describes "Lite-N-Time" Integrator Model SD-1. Lists price; includes 10-day free trial request card.

PRECISION TIMERS 219
The Standard Electric Time Co., 15-page booklet describes the Standard line of precision timers for accurately measuring time intervals, used in laboratory, testing, and production work.

COLORTRAN 220
Natural Lighting Corp., 20-page catalog describes ColorTran lighting equipment for motion picture and still photography. Includes prices.

ELECTRONIC FLASH EQUIPMENT 222
American Speedlight Corp. 3-hole punched illustrated leaflet describes the Ascorlight line of electronic flash equipment.

VERTICAL ENLARGEMENT CAMERA 223
Henry P. Korn Associated, Inc., 4-page leaflet describes the "Nutran" Model No. 360 vertical enlargement camera. Includes specifications.

COLOR PROCESSOR 229
Bald Eagle Corp., 4-page brochure describes new automatic color processor, including operation, installation needs.

THE QUALITY APPROACH
TO COLOR PROCESSING

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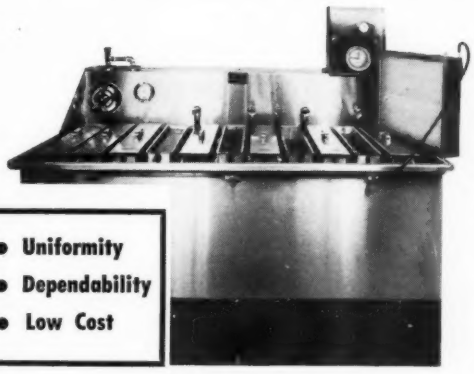
16 x20
TYPE C
PROCESSOR



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BERNALEN PROCESSORS "automatically" means quality—saving you costly time and money—assuring a dependable, uniform run.

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PRODUCTION OPTICAL PRINTER

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400 W. CULVER • Scottsdale, Arizona

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IFPA
INDUSTRY FILM PRODUCERS ASSOCIATION
Announces it's
SECOND NATIONAL CONVENTION
JUNE 2nd & 3rd, MIRAMAR HOTEL
Santa Monica, Calif.

The program will include instructional presentations and exhibits in all phases of the Industrial Film Field. In-Plant registrants are cordially welcomed to attend and get a close-up of the latest technical achievements, attend the unique Products Clinic, and talk over their production problems with experts who will be present.

Speakers at the event will include several nationally known leaders in the Industrial Film Profession, such as NASA, USIA, Warner Bros, etc. Subjects to be covered will include the use of 8mm equipment for professional purposes in Industry, Low Budget Animation, Music and Sound Techniques, etc.

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CONVENTION REGISTRATION, OR OTHER PARTICULARS, CONTACT:

Paul Garrison Organization
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Los Angeles 25, Calif.

Get more information. Circle 448, page 79

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- Complete **EASTMAN COLOR** 16 - 35 mm negative — positive processing.
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BARNDOOR 225
Lowel-Light leaflet and reprint from *Modern Photography* describes and evaluates Lowel's pocket-size barndoors and light fixture. Includes prices.

COLOR MEASUREMENT 221
Allied Research Associates, Inc., two 4-page brochures, describe Green-Bartlett technique of high-speed automatic color measurement. One booklet on general product sorting capabilities and the other on technical details and applications of the colorimeter.

"ELECTRONICS REPRINT" 227
Electronic Applications, Inc., offers reprint of article from *Electronics* titled "Magnetic Tape Recorder Programs Engine Dynamometer Tests."

ELECTROSTORE 228
Image Instrument, Inc., 4-page bulletin gives details of Electrostore, which makes it possible to store and recall a television picture when desired.

GRAPHIC ARTS

BURKE & JAMES CATALOG 230
Burke & James, Inc., 148-page reference volume contains items for almost any photographic need including equipment suitable for graphic arts applications.

DRAFTING FILM TESTS 231
Keuffel & Esser Co. 8-page brochure gives results of tests of Herculene® drafting film. Includes information on the application of Herculene for both washable and non-washable tracings.

PROPORTION RULE
Kurshan & Lang Color Service, Inc., proportion scale designed to ascertain new reproduction sizes for original art, copy or photographs, give percentage of enlargement or reduction, etc. Request on letterhead from Kurshan & Lang, 10 E. 46th St., New York, N.Y.

SCREENED PRINTS 233
Mask-O-Neg. Reprint, "Photography of Halftone Copy," from *The Graphic Arts Monthly* gives a description of various methods to reproduce halftone copy by rescreening.

K & E BROCHURE 234
Keuffel & Esser Co. 6-page brochure contains the answers to 100 of the most often asked questions about reptoduction and drafting process and materials.

MAGNIFYING GLASSES 235
American Thermo-Ware Co. 10-page leaflet describes and illustrates the ATCO line of reading and magnifying glasses. Contains specifications and price list.

REPELZIT 236
The Anchor Chemical Co. 4-page illustrated folder describes additional uses for Repelzit originally developed as an anti-smudging and set-off agent.

FOSTER CATALOG 237
Foster Mfg. Co., 32-page catalog on composing room and photo-mechanical products available. Fully illustrated with specifications on new products.

GOWLANDFLEX

- 4x5 & 5x7 sizes 90mm 70mm 35mm roll film backs
- Gives you large film quality with a candid approach
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- Write for Detailed Literature

PETER GOWLAND GL. 4-7867
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4

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IMPORTANT! Be sure to clip this ad and send it along with your color slides.

Colorfax Laboratories, Inc.
1160 Bonifant Street, Dept. R, Silver Spring, Maryland

Get more information. Circle 417, page 79

MICROFILM OPERATION 238
Minnesota Mining and Mfg. Co., 8-page booklet describing operations of the engineering documents section of the U.S. Army Rocket and Guided Missile Agency (ARGMA). Includes description of retrieval, card-to-paper or card-to-card printout and distribution of engineering drawing.

SERVICES

COLOR PRINT SERVICE 239
Colortronics 2-page color brochure explains the Colortronic method for making Ektacolor prints using LogEtronic equipment.

SLIDE-O-CHROME PRICES 240
Slide-O-Chrome Corp. 6-page revised price list from this New York lab also lists services available.

KAFKA COLOR LABS 241
Kafka Color Laboratories, Inc. 20-page booklet from this New York lab lists prices and services available.

COLOR SERVICES 242
Norman Kurshan, Inc. 4-page bulletin from this New York lab gives color services available and prices.

DEXTER PRICE LIST 243
Dexter Color New York, Inc., 14-page booklet gives prices for custom-made color advertising post cards, miniature albums and brochures. Includes samples of post cards.

PRICE LIST 245
Rapid Color, Inc., 19-page price list covers all photographic color reproduction work done in the Rapid Color Laboratory.

COLOR FILM PROCESSING 246
Cineque Colorfilm Labs, Inc., 4-page leaflet describes the various services of Cineque. Includes processing, duplicating, slides, filmstrips and transparancies.

MOTION PICTURES

MOTION PICTURE PROCESSING 248
Byron Motion Pictures, Inc. Catalog from this Washington, D.C. Lab lists services available and prices. Includes section on producers' services and general information.

DUAL STEERING DOLLY 249
J.G. McAlister, Inc. 16-page illustrated booklet describes the J.G. McAlister dual steering crab dolly. Includes specifications.

MOVIOLA CRAB DOLLY 250
Moviola Mfg. Co. Three-hole punched catalog sheet describes and illustrates the Moviola crab dolly for television and motion pictures. Includes specifications and prices.

FILM EDITING EQUIPMENT 251
Hollywood Film Co., 60-page illustrated catalog describes HFC line of film editing equipment. Gives description of product planning, engineering and styling. Price lists included.

OPPORTUNITIES IN FLORIDA

PHOTOGRAPHIC ENGINEER Must have college degree with a major in mechanical photography, optical engineering, or physics. Must have a thorough working knowledge of photo chemistry, photography, theory of optics, electronics, and principles of camera design.

PHOTOGRAPHERS Must have 2 years of college and specialized training in photography (both motion picture and still), scientific photography and techniques used in industrial and commercial photography.

PHOTOGRAPHIC TECHNICIANS Must have 2 years of specialized training in photographic science, and a working knowledge of sensitometry, densitometry, photo chemistry, color printing, and color process control.

These opportunities provide good wages with many employee benefits, plus the security and permanence of working with the largest firm in its field in the world. You and your family share the pleasures of living on Florida's lower east coast.

If you are qualified for these positions, we want to hear from you. All qualified applicants will receive equal employment consideration without regard to race, color, creed or national origin. Simply send your resume and salary requirements today to: Mr. F. K. Gates,

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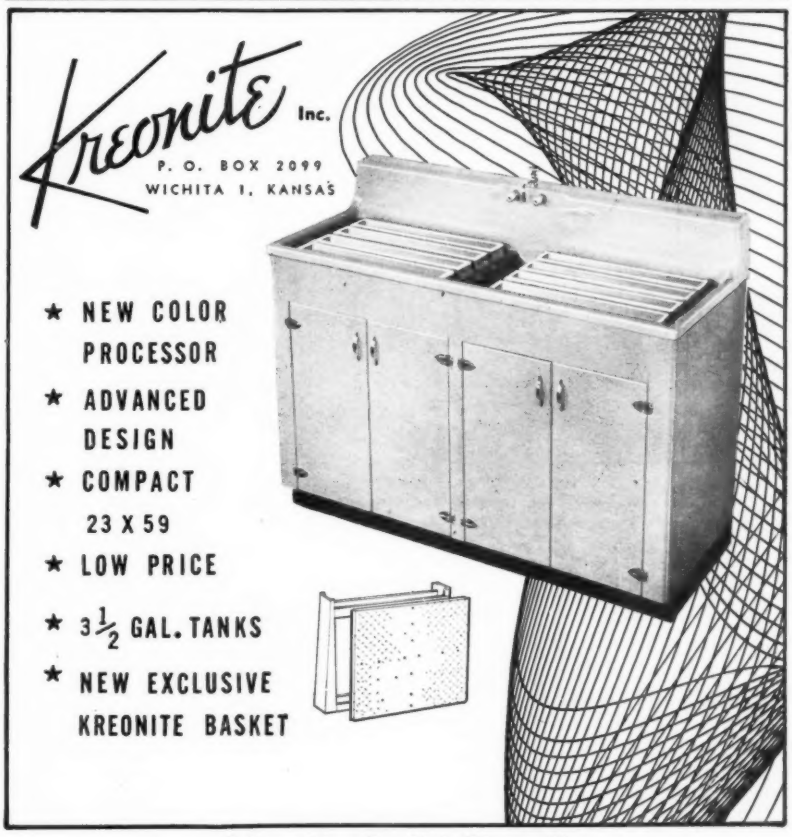
Florida Research & Development Center
Division of United Aircraft Corporation
WEST PALM BEACH, FLORIDA
Get more information. Circle 488, page 79



Get more information. Circle 451, page 79

WE LOVE CUSTOMERS
(continued from page 55)

covering the proper method of preparing film for the lab, including: Preparation of Original A & B Rolls; Preparation of 16mm Printing Leaders; Methods of Marking Work Prints. These are available from us without charge.

ART RESHER

Capitol Film Laboratories, Washington, D. C., reports:

The average in-plant man seems to think of a lab in terms of a processing station where all he has to do is drop his film off and he gets what he wants. A commercial lab offers such a variety of services that the customer should know what he needs. For example, does he want a single-light print, a timed print; does he want a work print, does he want edge numbers, does he want film returned on a core or spool?

The cameraman should get to know the expediter at his lab so that if he has a particular problem he can talk to a man who knows the customer.

In shooting footage, too often the in-plant man, who may have started as a still man and who gradually began doing more movie work, makes excessive pans. Sometimes he won't use enough close-ups to cover a scene or won't shoot the scene long enough. We've noticed a great reluctance to shoot lip-sync on the part of in-plant men. If he has troubles or doubts about technical matters, he can get help from the field rep of his lab.

For the man starting out in movies, I would say that one thing he should do is look at some good films, analyze them scene by scene to see how they solved certain problems of lighting or tempo. Look at the films from his viewpoint and see how they solved similar problems.

BUD STONE

Consolidated Film Industries, New York, reports that:

There are areas where a lab can provide valuable assistance to the cameraman before he shoots a picture. A qualified lab technician can make many valuable suggestions which can save his company both time and money. If necessary, a liaison man can work with the cameraman to help solve special problems. Cinex strips for scene tests are furnished for 35mm shooting, telling the cameraman the printing exposure used, giving him some idea of how his exposures will look on the print.

Labs can provide editing facilities and screening rooms. Negative edge numbering service is available. Various optical effects can be suggested and provided. Even storage facilities are available. Careful reading of the literature from different labs will give the in-plant man an idea of what is available and what his costs will be. This is information which his management needs if it intends to plan a movie program for the company intelligently and efficiently.

BUD STONE

COLORTRAN LIGHTS THE WORLD...from sunny California to the remote corners of the globe you'll find Colortran for sale or rental, lighting the way for motion picture and still photographers. Because of its compactness Colortran travels with you to the wide-open spaces and to otherwise inaccessible areas on sets and on location. Whether you work with color or black-and-white film Colortran offers you more trouble-free illumination for less money. Continually refined, improved, and perfected, Colortran is indispensable to those who demand flexibility and high standards.

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Cinemaster Chief Mark II controls ten 500 watt PAR lamps (3400°K) $309

CineKing - accommodates both 300 watt PAR 56 and 500 watt PAR 64 lamps $42.95

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NEW PRODUCTS

For additional information on any new product circle the appropriate number on the readers' service card, page 79.

AUTOMATED COLOR PROCESSOR 101
A processor designed to automate the processing of both color film and color paper materials up to 20 x 24 in. is available from Murmatics, Inc. The Model CF 324, a 15 tank straight line combination processing unit, can accommodate Ektacolor film in roll film sizes, sheet films to 8 x 10, Ektacolor Print Film to 20 x 24, and Ektacolor paper to 20 x 24 in. An optional mural adapter permits the automatic processing of murals to 24 x 36 in. The unit measures 9 ft. long, 31 in. wide and 78 in. high. Price: $4000.

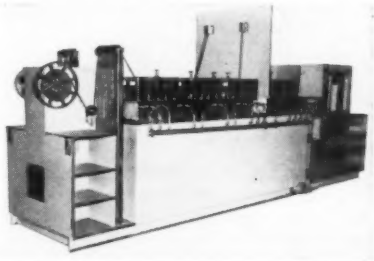
COLOR REVERSAL FILM
Eastman Kodak Co. has announced the availability of 120-size roll, Kodak Color Reversal film, Daylight Type SO125, ASA 16, and Type B SO126, ASA 125. They are similar to 35mm Kodak High-Speed Ektachrome and are designed for processing in Kodak Ektachrome Process E-2, according to the manufacturer. Price: $1.75/roll (min order 20 rolls).

FADE-GARD 103
A new process which protects color prints from fade-causing ultra-violet light has been announced by The Fade-Gard Corp., a subsidiary of Grayson-Robinson Stores, Inc. The Fade-Gard process, which employs a soluble chemical in the print processing, is said to provide at least 14 times greater immunity to fading than now exists. Presently applicable to any type or manufacture of color films, including transparencies, it is available initially only for prints. Applications in the finishing of all graphic art reproduction, including printing and lithography, are foreseen.

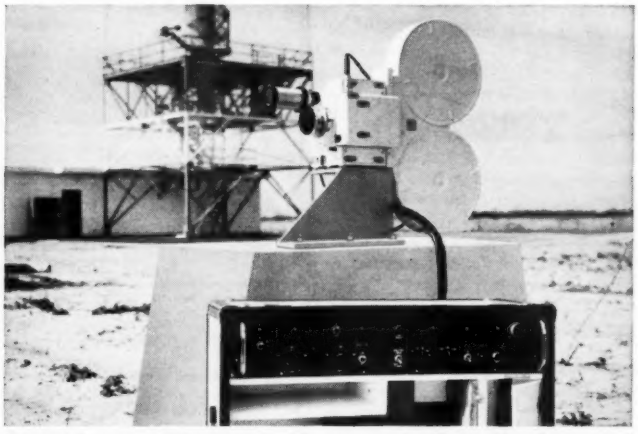
BAR-RAY PROCESSOR 102
The Bar-Ray Color Print Processor No. 1863 for Kodak Ektacolor Paper Type C has been announced by the Time-O-Lite Div. of Industrial Timer Corp. It accommodates baskets containing six 16 x 20 prints or six 8 x 10 and six 11 x 14 prints. Automatic nitrogen burst agitation is built into the processing basket. All controls, switches, gauges and dials are located on the back splash and a special suction device allows drainage of the system without lifting the inserts. The solution tanks are interchangeable and removable.

DESIGNER COLOTONES 135
The first five colors in a new series of Designer Colotones have been introduced by the Bourges Color Corp. The colors are Mauve, Teal Blue, Terra Cotta, Olive and Chartreuse; and are available in adhesive sheets for layouts and package designs and overlay sheets for color separations and actual camera copy. Prices: 10 x 12½ in., $1; 12½ x 20 in., $2; 20 x 25 in., $4.

COLOR FILM PROCESSOR 104
A combination 8/16mm and 35mm color film processor, called the Duplex Model 312, is a new product of the Houston Fearless Corp. It automatically processes 720 fph of 8 or 16mm and 240 fph of 35mm Kodachrome, or other compatible color, either simultaneously or independently, according to the manufacturer. Separate drive systems on opposite sides of the machine, one for 8/16mm and one for 35mm, utilize a common set of solution rinse and wash tanks, and dry box.



ON-SITE PHOTODATA



Camera is removed from case and set up. Backlighted control panel is connected to camera and to 110-volt power by two integral cables. The complete system is then ready to operate. Extra film, lenses and accessories are stored conveniently in case. Connections for Strobex Model 122 electronic flash are included.

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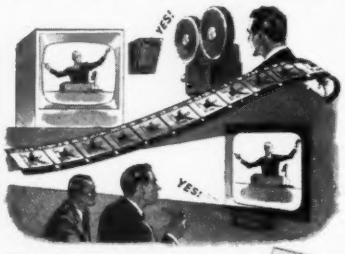

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MOVIEMATIC JR. 106
A compact 8mm repeater projector that weighs 12 lbs. and can be viewed in normal light is the Moviematic Jr., a product of Technical Service Inc. It gives continuous 5-min. performances without need for threading or rewinding, due to spliced film ends. Price: $98.50.

SEALEDREEL 105
Sealedreel, a packaged tape reel that seals tape and film from dust and humidity extremes is a new product of the Pro-Tex Reel Band Co. It is a molded resilient band that locks around the periphery of a reel and also wedges between the reel flanges to support them against bending.

UNIFLOOD 107
A fist-sized, sealed beam floodlamp, similar in appearance to an auto headlamp, has been produced by the General Electric Co. It features a 650W quartz lamp with an outer glass cover composed of 68 tiny lenses, which control the direction and shape of the light beam. Claimed to have a life of 16 hours, the Uniflood produces 37,000 candlepower and operates on standard household current. Price: $9.95.

HEAT-FIX 108
A direct-write light-sensitive oscillograph paper with writing speeds up to 40,000 ips is the Photo Engineering Industries' Heat-Fix. Said to be a completely dry process, after exposure the paper is subjected to heat which fixes the image. The original can be used for making reproductions on a diazo machine. Applications for the microfilm field are foreseen.

ILLUMINATED POINTER 109
The Rowi Illuminated Pointer for use in lectures or running commentary during film projection is 8¼ in. long and is operated by two pencil flashlight batteries. Its clear arrow tip is visible even against light backgrounds, according to the manufacturer.

HIGH-SPEED MICROFILM 128
A high-speed, fine grain microfilm which will be sold through commercial microfilm processors and dealers at prices said to be up to 15 per cent lower than those of existing brands has been announced by the Dynacolor Corp. A clear base type with removable dye backing, it is available in 16mm 100 and 200-ft. rolls and 35mm 100 and 1000-ft. rolls (all unperforated) and can be processed with any conventional equipment. The speed of the Dynacolor Microfilm is the approximate equivalent of ASA 30.

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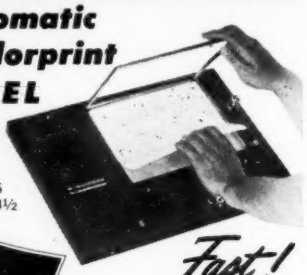

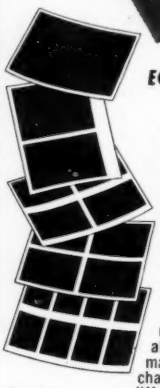

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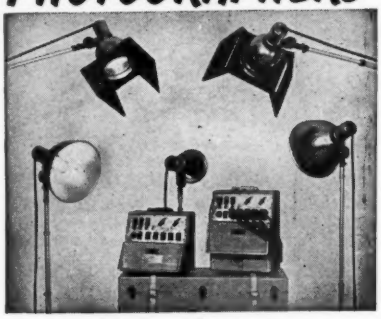

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PENTAX CLIP-ON METER 114
Minneapolis-Honeywell's Heiland Div. has introduced a new battery-powered exposure meter which clips on to the viewfinder frame of the Heiland Pentax H1 and H3 cameras and couples directly to the shutter speed dial. The meter incorporates a lens which limits its field of view to 40 degrees, and measures exposures as slow as one sec. at f/2 with ASA 100 film. The cell is powered by a 1.3V mercury battery with a normal life of from one to two years. Price: $32.50.

HI-FI TAPE RECORDER 115
The Norelco "Continental" 200 (Model EL3541) is a 4-track stereo tape recorder engineered for high fidelity by the North American Philips Co. Weighing 18 lbs., it operates at 7½ ips and accepts a maximum 7-in. diam. reel.

POLAROID TRANSPARENCY FILM 126
A high-contrast transparency film that produces black-and-white slides in ten sec. has been introduced for use with Polaroid Land Cameras. Called Type 146-L PolaLine Projection Film, it has a speed rating of 200 and produces eight 3¼ x 4¼ in. transparencies for use in standard lantern-slide projectors. Price: $3.49 per roll.

VACUUM BACK 127
A vacuum back for use with Goodkin Vertical Process Cameras and other makes has been produced by the M. P. Goodkin Co. Designed for darkroom use with Gevacopy, Photoplax and regular lithographic films, it features a sliding "Zone Selector," for 5 x 7 to 12 x 18-in. films, which permits the full force of the vacuum to be applied only across the area of the particular film size used. A larger vacuum back, accommodating 16 x 20 and 18 x 23 in. films is also available. Prices: standard back, with pump and motor—$224; larger back—$250.

FILM ADAPTER 110
Beattie-Coleman has introduced a film adapter for its Oscillotron which allows this oscilloscope camera to accept holders for standard 4 x 5 films, including Polaroid® packet, cut film, film pack, glass plate holders, or 120 roll film. The new attachment also permits ground glass focusing and can be interchanged with the standard Polaroid back which uses roll film for 10-sec. photography.

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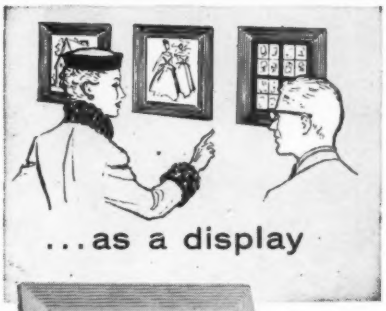

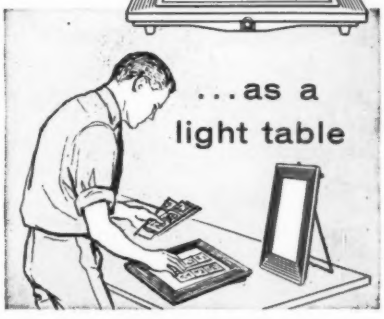

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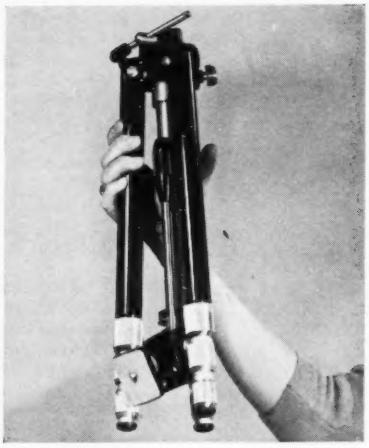

LO-BOY TRIPOD 113
A new product of Quick-Set, Inc., the Lo-Boy Tripod extends to 56½ in. and closes to 16 in. It weighs less than 4 lbs., has 4-section legs and an invertible elevator column. Price: $36.

AGFA ENLARGER 125
Agfa Inc. has announced its Varioscope 35/44 enlarger with Solagon II f/4.5 60mm lens and 150W lamp. It enlarges from 2½ to 10 times with automatic focusing; and with manual focusing enlarging is said to be virtually unlimited.

SATELLITE X-90 EF UNIT 116
A beep-emitting "Electronic-Ear" monitor circuit is a feature of the Satellite X-90 electronic flash unit manufactured by the Photronic Corp. of America. The monitor is designed to assure consistent exposures through the continuity of maximum power by emitting a beep only when the unit is at peak voltage. The flash unit has rechargeable nickel-cadium batteries that provide 125 flashes per charge with normal 8 to 13-sec. recycling time. The one-piece, self-contained unit, measuring 5 x 2½ x 2 in. and weighing 32 oz., fits all cameras. Price: $75.

NEW ARRIFLEX 35 123
A special model of the Arriflex 35, called the 35-IIB-S, applicable for both instrumentation and documentation, has been announced by the Arriflex Corp. It features a 32V DC motor for operation to 80 fps, which is equipped with an external rheostat for speed control. The camera will accept all Arriflex 35 standard accessories. Price: $1995.

S-M SLIDE MOUNTER 119
Seary-Michelbach's Fully-Automatic Slide Mounter has been redesigned to accommodate all popular makes and types of 35mm double frame slide mounts. The new design incorporates a high-lift shuttle with deep pockets in the feeding section and hold-down rails in the heat sealing section of the unit. The S-M Automatic can handle curled mounts and prevent jam-ups according to the manufacturer. Processing speed is said to be up to 120 rolls per hour.

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POLAROID DEVELOPMENTS

At the annual meeting of stockholders of the Polaroid Corporation, Cambridge, Mass., in April, Dr. Edwin H. Land, president, demonstrated four films utilizing the diffusion-transfer-reversal process, a production model of a new electric-eye camera "under $100," and some more efforts of Polaroid researchers in DTR color.

One of the films, a yet-unnamed product, is being developed for cathode ray tube recording work. Dr. Land stated that the equivalent speed of the demonstration product is 35,000, making it potentially useful for recording now elusive transient oscilloscope traces.

An X-ray film, the Polaroid Type 3000X radiographic packet with an effective speed comparable to 3000, is expected to be useful in a number of applications of medical radiography where quick access to information is imperative and/or low radiation dosage is important. Polaroid Corporation spokesmen estimate that exposure is in the order of 1/5 that necessary for conventional radiographic films. The 10 x 12 film is exposed with a calcium tungstate fluorescing intensifying screen in a Picker-Polaroid Cassette, then processed in a Picker-Polaroid Processing unit. Development and image transfer take place in 10 sec. The packet and the exposure and processing devices are marketed by the Picker X-Ray Corporation.

The new P/N positive-negative film for Polaroid Land Model 500 4 x 5 film holders was again demonstrated (the first public showing was at the Master Photo Dealers and Finishers Association show in March). Deliveries are expected "later this spring."

Also demonstrated was the Type 146-L PolaLine transparency film for projection slides of high-contrast copy.

Color prints, first shown a year ago, displayed improved quality according to an observer. The company, it was reported, is now making short trial runs on production equipment for the film. Dr. Land stated that it normally requires a year to adjust equipment and procedures for full scale production. Therefore, barring unforseen circumstances, he felt that the company should be able to get the color film on the market sometime in 1962.—THE END

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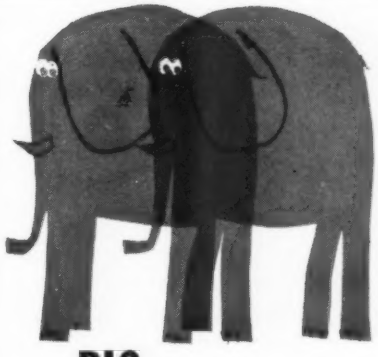

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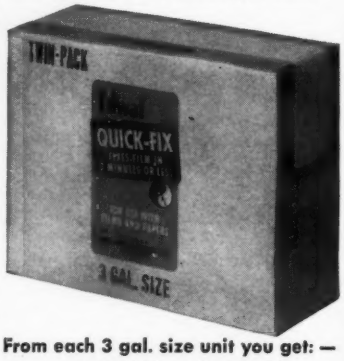

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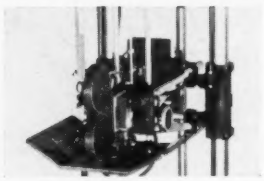

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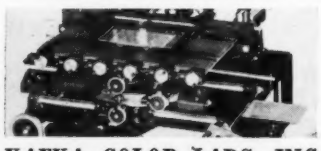

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HYZER ON HIGH SPEED

(*continued from page* 61)

next time—and relieve yourself of some of the responsibility that goes along with spoiling half a dozen rolls of film!

You may find that an engineer or machine operator who is familiar with the application can do the best job of synchronizing the camera running. In noisy surroundings, have the operator place his ear close to the camera, so he can best determine when it reaches running speed and whether or not he successfully synchronized it with the action.

The chart graphically illustrates the relation between event duration and camera writing time that is applicable to manual synchronization. Writing time in this case refers to the time required for the film to go through the camera once it attains operating speed.

When a synchronization technique is questionable, there is strong argument in favor of processing the film immediately to be sure the record is complete. Sloppy processing to merely spot-check performance may not be the answer because of the irreproducibility of manual synchronization. The event may be perfectly synchronized with camera on the quickly processed record and completely missed on the next three sent out for development. Portable processors, exemplified by the Cramer Model 60 and the Fairchild Minirapid 16, produce high-quality results right on location without the necessity of either a darkroom or running water. The Fairchild machine, an extremely portable and convenient one to operate, is restricted to negative processing and specific emulsion types that will withstand the rigors of high-temperature development. The Cramer machine, manufactured by Milsco Manufacturing Co. of Milwaukee, although less compact, is definitely more flexible and will handle both negative and reversal processing of all emulsion types. When the results of a test cannot be predetermined with a degree of confidence, the alternatives are to take your chances or process the films while the set-up is still intact. Personally, I prefer the latter approach.—THE END

(This article is based in part on Mr. Hyzer's forthcoming book, Engineering and Scientific High-Speed Photography *to be published by the Macmillan Co., New York.)*

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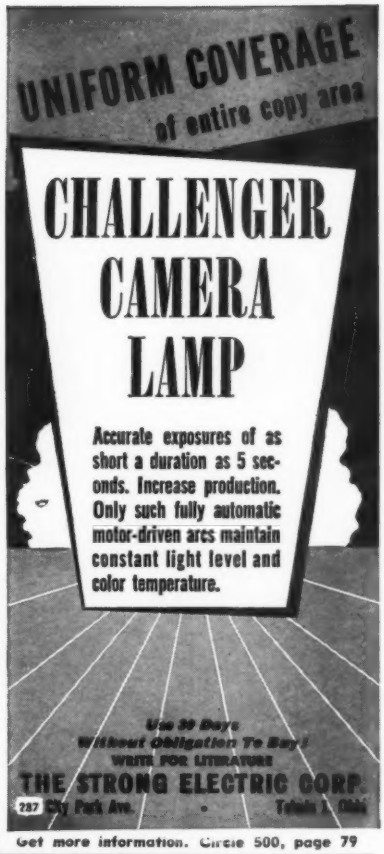
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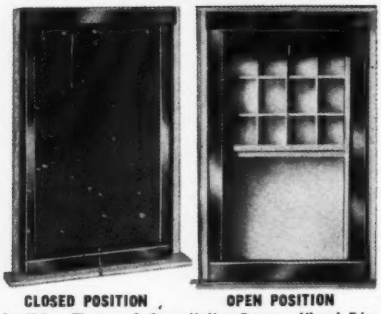

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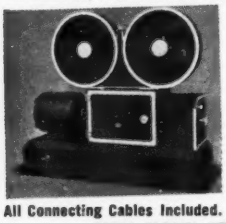

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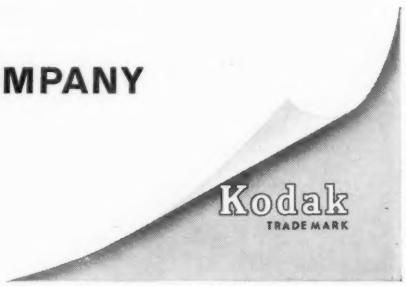
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